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**The Role of Institutional Entrepreneurship in Standard Wars:
The Case of Blu-ray Disc**

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2013

Declaration

I hereby declare that this thesis entitled 'The Role of Institutional Entrepreneurship: The Case of Blu-ray Disc' represents the results of my own work except where specified in the thesis.

Shen-Chen Chang

Abstract

The study is to use institutional entrepreneurship perspective to complement the functionalist's viewpoint to understand the process underlying collective action in a mature eco-system and how institutional entrepreneurs manage critical stakeholder relations, collective action and discursive activities in technical standard change processes. The standard war of Sony Blu-ray Disc vs. Toshiba HD DVD is used as a critical and intrinsic case. The functionalist's viewpoints have paid much attentions to the numbers of customers adopting new technologies, and etc. By means of institutional entrepreneurship perspective, it claims that it does not matter about the number and amount, but it does matter about how focal firms make the markets believe that they have the abilities to win standard wars. The study further claims that the variables studied in functionalist's viewpoint also have the meanings of institutional entrepreneurship perspective. Moreover, the BD and HD DVD standards are incremental innovations in a mature field where there are many things are settled down. Focal firms can easily forecast the expectations of the dominant institutional logics. The study contributes that institutional entrepreneurship perspective still provides the process insight to complement the functionalist's viewpoint. This perspective can be applied in emerging field, where it is no dominant logics and the innovations are likely to be radical. The BD case represents a critical case. It can makes possible naturalistic generalization to other similar contexts. Eisenhardt's principles are used to build theory from the case study. I borrowed techniques of open coding to analyze the data. The findings show that collective action (including critical stakeholder management and structuring collaboration capabilities) and discursive activities are the central features of institutional entrepreneurship. They have mutual relationship with the institutional

entrepreneur's resources (power and legitimacy). Furthermore, good collective action and discursive activities can lead to network effects and product performance.

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Chapter 1. Introduction

In 2002, Sony announced that, in cooperation with eight other leading companies, they had established the basic specifications for a next-generation large capacity optical disc video recording standard called Blu-ray Disc (BD). BD satisfied the demand for much higher storage capacity and better copyright protection for DVDs. Shortly afterwards, Toshiba, another leading Japanese electronics company, announced the establishment of an HD DVD standard in order to compete with Sony. In the competition to become the single new generation optical storage device standard, Sony and Toshiba attempted to gain the support of critical actors and interest groups. They promoted their own ideas and criticized each other's technical problems using the media, technical exhibitions and so forth. Moreover, they sought support from Hollywood studios and PC companies. Their efforts to develop a joint standard and avoid a format war failed. To begin with, HD DVD seemed to have gained the lead in terms of support from movie studios in 2004, and in terms of market share in 2006. In 2007, however, many studios and video retailers announced that they were exclusively supporting the BD format. In January 2008, Warner Brothers announced that it would not support the HD DVD standard. This announcement caused a chain reaction among DVD retailers. Later, Wal-Mart announced that it would phase the HD DVD standard out completely by June 2008. Subsequently, in early 2008, Toshiba announced that they would no longer support any aspect of the HD DVD format, including its hardware, software and supporting specifications. Sony had won the competition and BD had become the new technological standard.

The existing literature on standard wars identifies various factors that could explain their final outcomes, including adoption, timing of entry, product performance and so on. Some studies propose integrative frameworks to explain which factors influence the likelihood of victory in standard wars. Most of these frameworks are based on a functionalist perspective. In general, the perspective attempts to identify the factors that determine the outcome of standard wars. For instance, the number of adopters of the standard is a crucial factor. It stresses how network effects result from the number of customers adopting the new standard/products. In this vein, customers tend to rationally choose the standard with the highest number of adopters in the market. Consequently, the functionalist perspective outlines the factors which are seen as actively contributing to the victory of one of the competitors in a standard war.

However, the functionalist perspective neglects the importance of process, referring to the role of the actor in the emergent series of actions and changes bringing about a result. This is the focus of the institutional entrepreneurship perspective which stress the role of the institutional entrepreneur and the interaction between actors. For example, in relation of network effects, it does not only matter how many customers have adopted the standard or products. Rather, what also matters is the process that influences whether and how actors adopt a specific standard/product. This perspective stresses that the actions through which actors define, develop and legitimise a proposed new standard, and compete and cooperate with others in order to succeed. Institutional theory also examines the role of cognition in these processes. This study integrates contributions from various strands of literature. Most significantly, though, it applies institutional theory and, in particular, theories of institutional entrepreneurship in an attempt to provide a new contribution to the literature on standard wars.

The empirical part of this study is an in-depth single case study of the standard war between BD and HD DVD. Toshiba had gained the dominant position in the previous DVD standard and had won two previous wars over earlier standards in the same technological field. In the new standard war, Toshiba was in competition with Sony. It tried first to upgrade the DVD standard and then proposed the new standard – HD DVD – while Sony developed its own brand-new standard – the Blu-ray Disc. Sony faced a competitor who had a dominant position within the previous institutional arrangements of this field. It can be argued that this case presents all the relevant issues identified in the literature and provides a useful basis for theory building and development.

Researchers cannot understand the BD-HD DVD standard war without understanding the previous standard wars around standards in analog videotape (JVC VHS vs. Sony Betamax), CD (Compact Disc), and DVD (Sony's MMCD vs. Toshiba MD). BD and HD DVD are incremental improvements over the previous standards and developed in an institutional field with already well established institutions and powerful actors in what may be described as a mature eco-system. The new standards follow a mature technological trajectory. Many players are involved in the trajectory and group around the technology as well-converged stakeholder groups. This study aims at complementing the functionalist perspective with institutional theory. This will be done through an in-depth study of the BD-HD DVD case.

Chapter 2 of this study reviews the perspectives of the literature on standard wars. In general, the relevant literatures can be divided into rational and social accounts. The rational account represents the functionalist perspective stressing factor determining the

outcome while the social account represents the institutionalist perspective that stresses insight into the unfolding process in a standard war. This study will further elaborate the meanings of rational and social accounts in strategy, industrial economics, social cognition, and the stakeholder perspectives. Further, the social account will discuss the role of institutional theory in standard wars.

On this basis it develops an integrative framework with a focus on the role of institutional entrepreneurship. This model is then used as a structuring device in the analysis of the standard war between Sony BD and Toshiba HD DVD, in order to build a new theory concerning standard wars. The new theory builds from the case study substantially retains the categories and relationships of the analytical framework from the literature review, but also provides new insights. It highlights factors which are not generally included in other studies, such as human resource management practices in relation to core employees, their personal social capital, and the influence of the media.

This introductory chapter continues by outlining in more detail the challenges faced by focal firms in standard wars. This section leads to the general research question. The next section argues for the crucial role of institutional entrepreneurship in relation to different groups of stakeholders. This provides the background for three research sub-questions. This is followed by a brief presentation of the case: i.e. an account of how the actual standard war unfolded. I will argue that this case study is well suited to the task of developing a theory from the theoretical framework. The penultimate section concerns the methods used to collect and analyze the case study data. The last section will present the structure of the thesis.

1.1. The Importance of Studying Standard Wars

When a firm owns a technical standard which it cannot implement well, and/or which is misaligned with the firm's interests, the firm may wish to alter or change that standard. However, such a change project is likely to be very time- and money-consuming. Moreover, other firms may also propose alternative standards. In order to successfully change the standard and to obtain the considerable economic benefits which result from it, the firm will ally itself with other firms who have the same goals, stakes and/or vision. The advantage of involving many companies is not only that the costs of technological change processes are shared, but also that resources are aggregated which will help the new standard to be strengthened and promoted. This will enable the firm to compete more effectively with rival companies.

In detail, within these processes of technical change, the focal firm and its partners frame their visions, promote their projects, undermine the projects of their competitors, and motivate other companies to join their project. At the same time, competitors who have developed alternative projects may attempt to gain support from the same companies. They therefore position themselves (through public relation, media, technical definitions, etc.) so that they can demonstrate the legitimacy of their own standards, negotiate support from key actors or stakeholders in the relevant industries, release competitive products for market share, and so on. These focal firms aim to beat their competitors by using strategies of various kinds. These actions introduce turbulence and uncertainty to the process. Scholars of technology innovation management call these processes 'standard wars'. The price of a standard war can be huge. When a firm wins the war and its standard becomes the dominant design,

however, it will gain a monopoly position in the relevant industry, with all the resulting benefits.

Standards are crucial for the development of markets. They provide compatibility between systems and products, serve to enhance product quality, reduce uncertainty, and establish norms in a given field. In other words, standards elaborate a political, social, technical and economic consensus at a particular time, and articulate an improvement in market delivery. New standards have to respond not only to the requirement of functionality but also to consumer sensitivity and price. Furthermore, because customers' preferences change quickly, due to shorter product life cycles and the convergence of multiple technologies, firms now need to speed up their innovations and change their technological standards more quickly than they did in the past. In turn, focal firms have to rapidly convince their markets and consumers that their new standard is better than the competing standards, in order to recover the huge investments involved in standard wars. The focal firms not only ally themselves with other firms to win standard wars and gain a dominant position, but also make efforts to create industry-wide understandings in their target fields.

The main aim of this study is to examine how focal firms develop technical standards for markets and to determine which practices are deployed in standard wars. There are many empirical studies about standard wars in the late 20th century. Most of them concern product performance and network effects. A few empirical studies, mainly produced in the 21st century, embrace different methods of studying standard wars. These new approaches have been developed in fields other than the study of standard wars, such as framing in social movements and discursive activities in technology

management. Unfortunately, although these studies have produced some interesting findings, they have not produced a well-developed theory to integrate their work with existing studies (of product performance and network effects). Scholars have indicated that standards share attributes with institutions, and that standard wars share attributes with processes of institutionalisation, where the processes connote the meaning of competition between different existing institutions and new ideas. The study focuses on the means by which focal firms succeed as institutional entrepreneurs in standard wars against competitors who have held leading and dominant positions in the previous institutional arrangements, resulting from victories in previous standard wars in the relevant technological field. As a result, this study proposes that the overall research question is as follows:

How can an institutional perspective complement a functional perspective to understand the process underlying collective action in a mature eco-system?

1.2. Institutional Entrepreneurship and Stakeholders

Institutional theory has frequently emphasised stability and conformity over change and entrepreneurial actions. However, there has recently been an increased interest in institutional change and the role of institutional entrepreneurship, defined as the ‘activities of actors who have interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones’ (Maguire, Hardy, & Lawrence, 2004: 957). The relevant studies have highlighted collective actions by which social actors legitimise new institutional arrangements, often through the influence of the media. Technical standards can be viewed as institutions: they are

not only technical specifications but embody wider characteristics such as rules, norms and cultural cognitions. Existing institutions may be misaligned with the interests of social actors and/or with other institutions. Likewise, current standards and their institutional aspects may be misaligned with the interests of social actors or not perform well enough, and this will trigger the social actors to alter the institutions. Studies of institutional entrepreneurship have highlighted the characteristics and tactics which can help institutional entrepreneurs to change institutions. Such studies indicate that the roles of collaboration and the meanings attached by various actors to new institutions are critical in institutional entrepreneurship. As a result, this study will focus on the collaborative and discursive aspects of institutional entrepreneurship.

Studies of previous standard wars in the optical storage device industry¹, such as that between JVC's VHS (Video Home System) and Sony's Betamax in the 1980s, and between Toshiba's SD (Super Density) and Sony-Philips' MMCD (Multimedia Compact Disc) in the 1990s, have demonstrated the importance of stakeholders. Furthermore, scholars of institutional entrepreneurship view organizations as nexuses of stakeholder relationships, where stakeholders include suppliers, manufacturers, consumers and professional associations.

Accordingly, this study focuses primarily on the relationship between institutional entrepreneurs and stakeholders. It distinguishes between different groups of stakeholders, as well as between those aspects of entrepreneurship which are crucial in relation to each group. It identifies three groups of stakeholders: (a) critical

¹ Optical storage devices are defined as storage devices in which data is written, burnt, and removed by using a focused optical beam. Including CD, DVD, HD DVD, and BD can be viewed as a kind of standard of optical storage.

stakeholders, (b) group members, and (c) prospective consumers and competitors. The critical stakeholders constitute the close partners of the focal firm (eg. Hollywood studios, electronic product manufacturers, games software developers and publishers, and the main retailers). The group members are the other stakeholders which cooperate with the focal firm with the common aim of winning the standard war. The third group consists of all the relevant actors who are not part of the group organized around the focal actor in its effort to win the standard war: firstly, the general public and lead users, as well as media and experts who influence the perceptions and interpretations of prospective consumers of products which embody the new standard; and secondly, competitors and their allies.

The importance of managing the critical stakeholders in institutional entrepreneurship is emphasised in this study. The term ‘critical stakeholders’ refers to reputational actors who have critical resources for the organization’s R&D activities, manufacturing and marketing as part of processes of technological standard change. The participation of such stakeholders directly contributes to the new standards of focal firms, in both functional and symbolic terms. Their participation not only influence the network effects and product performance of technological standards, but also motivates other organizations to engage in a particular collaboration.

Compared to critical stakeholders, general stakeholders possess resources, which are less critical, both functionally and symbolically. They are unable to directly influence the theorisation and specification of new standards, but they can support those materials which are co-developed by institutional entrepreneurs and critical stakeholders. General stakeholders have less reputation and credibility in a given institutional setting.

However, the amount of general stakeholders' support also motivate the actions of stakeholders (including prospective consumers and organizations who may or may not be engaged in competitor's camps) to support the camp of the focal firm.

The study analyses the role of critical stakeholders and distinguishes these stakeholders from other, general stakeholders, The criticality of 'critical stakeholder' is, of course, a continuous variable rather than a dichotomous one. However, for the sake of simplicity we merely single out critical stakeholders rather than analyzing degrees of criticality. Institutional entrepreneurs may initiate many different tasks simultaneously. Because no individual organization can efficiently complete all of tasks, institutional entrepreneurs have to select qualified stakeholders for specific tasks.

Institutional entrepreneurs face more and more complex tasks and resistance in the process. In order to deal with them and defeat rivals efficiently, the institutional entrepreneur tends to establish a 'stakeholders pool' in the beginning. The pool can be seen as a group of stakeholders with applicable skills and resources (functional and symbolic) who are available for the institutional entrepreneurship. Having the pool in the beginning has two advantages in the process. First, in the symbolic aspect, the institutional entrepreneur can use the stakeholders as signals. These signals can be used to keep motivating more and more organizations to engage in the project. Second, in the functional aspect, having the pool can make the institutional entrepreneurs better understand the capabilities of the various stakeholders. Moreover, the institutional entrepreneurs can make the stakeholders understand the evolving plan as well as possible. Hence, the inclusion of such stakeholder at an early stage can help the institutional entrepreneur to efficiently deal with the tasks when the role of the

stakeholder becomes functionally crucial. At the moment, the criticality of the stakeholder is high. In this vein, the criticality of stakeholders will be high when they are functionally crucial but will be low when they are not. In this vein, the profile and criticality of stakeholders are dynamic in the process.

In previous studies, the ways in which institutional entrepreneurs interact with critical stakeholders, for example by constructing identities to obtain their support, have received only limited attention. However, both Sony and Toshiba understood that, for instance, Hollywood studios were critical stakeholders. The products and services of these content providers can significantly increase the network effects of standards, and it is therefore crucially important to identify how their relationships with crucial stakeholders are managed. The stakes are high, and institutional entrepreneurs need close relationships with these critical stakeholders. They may radically alter the situation by moving their support, and it is crucial to keep them satisfied and on board through continual interaction, convincing them to collaborate, and providing exclusive support and resources, etc. This is termed 'critical stakeholder management' in this study, and it encompasses more than just economic and technical factors. The study also examines the ways in which institutional entrepreneurs change their technological standards from sociological and management viewpoints. Technology is seen as emerging from socio-political processes. The specifications of new technology can be seen as the result of negotiation between the institutional entrepreneur, critical stakeholders and other member organizations in collaborations. Moreover, the possession of superior technology does not guarantee that the focal firm will win the standard war. The socio-political and managerial processes within standard wars are crucial in this respect.

Figure 1.1 The relationships between institutional entrepreneurs and critical stakeholders.

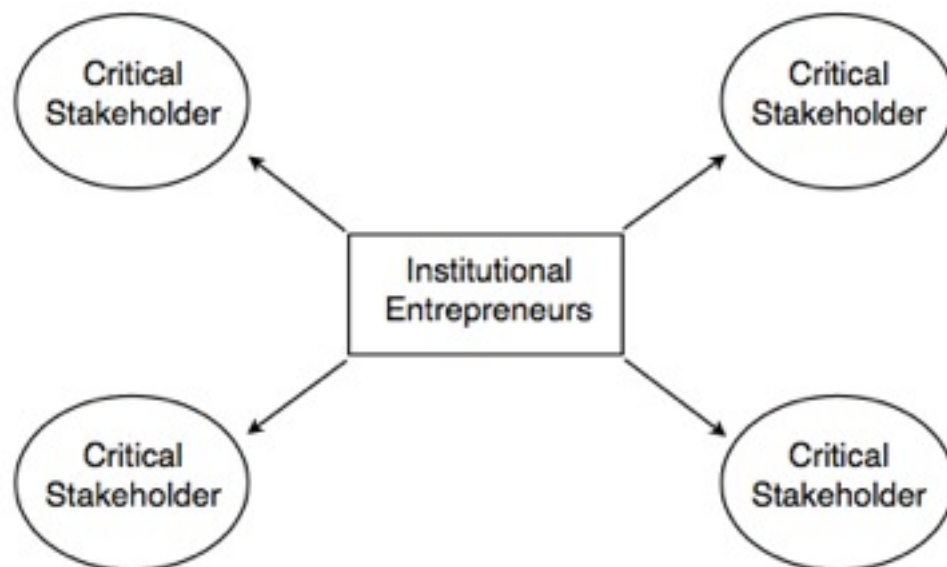


Figure 1.1 illustrates how institutional entrepreneurs manage their relationships with critical stakeholders and maintain close relationships with them. The study aims to uncover the practices through which institutional entrepreneurs manage stakeholders in standard wars. This is the first research sub-question:

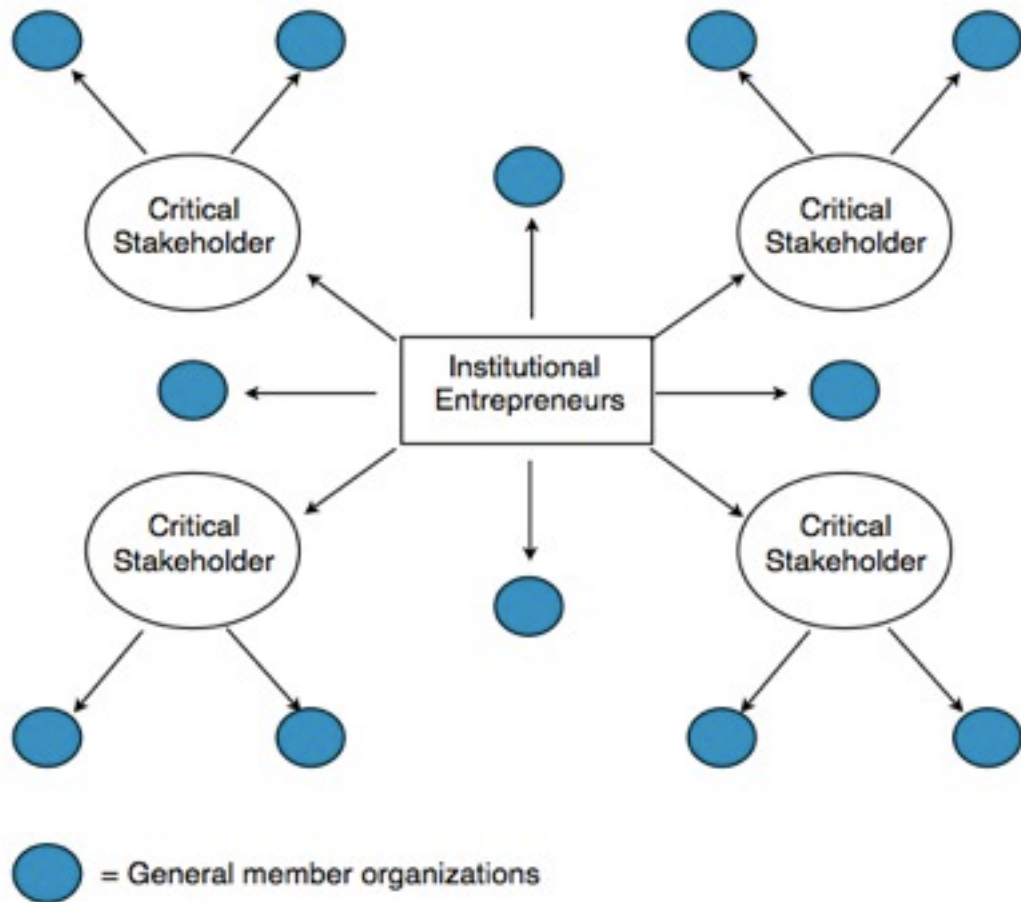
1. How do institutional entrepreneurs manage critical stakeholders in technological standard change processes?

In institutional entrepreneurship, institutional entrepreneurs do not just need the support and resources of critical stakeholders, but must also ally themselves with other partners. Institutional entrepreneurs can be expected to have distinct methods of cooperating with them, which are distinct from their links with critical stakeholders. They may also strive

to have more members, i.e. organizations, on their side, which will increase their ability to spread their standard across other technological fields and applications.

A discussion of the role of critical stakeholders and a new theory concerning the practices (i.e. critical stakeholder management capability) used in standard wars is one of this study's main contributions to research. Unlike existing empirical studies, this study explicitly discusses the role of critical stakeholders, identifies their importance in standard wars, and describes the essential practices involved in critical stakeholder management capability. It suggests that institutional entrepreneurs should cooperate with two kinds of stakeholders (critical and general) in standard wars. Institutional entrepreneurs prefer to maintain intensive relationships with critical stakeholders, rather than general stakeholders, because of the critical nature of their physical and symbolic resources. Initiating technological standard change projects requires careful planning. Institutional entrepreneurs should invite a number of critical stakeholders to become part of the processes of theorising the specification of their new standard and of establishing their marketing campaign. There are almost certainly no critical stakeholders who are suitable for every task. For this reason, focal firms need to select different types of critical stakeholders in the beginning of the process, and, at the same time, institutional entrepreneurs should be able to select suitable critical stakeholders for collaborations. These critical stakeholders should, as a result, be able completely to engage in the development of specifications and standard wars, and should understand which actions and strategies are appropriate for new standards. This discussion demonstrates that the role of critical stakeholders in standard wars is both primary and essential.

Figure 1.2 The relationships between institutional entrepreneurs, critical stakeholders and general members.



Furthermore, critical stakeholders may bring their connections to other organizations to bear on the institutional entrepreneur's projects, as shown in Figure 1.2. Institutional entrepreneurs, critical stakeholders and other member organizations construct a web that can be mobilized for collective action in an institutional change project. Previous studies of institutional entrepreneurship and standard wars have paid attention to the role of collective action, which is seen mainly as establishing professional associations in institutional entrepreneurship. However, the relevant studies have not identified the practices that should be included in collaborations for collective action. Hence, the second sub-research question is:

2. How do institutional entrepreneurs use collective actions to manage all group members, including critical stakeholders, in technological standard change processes?

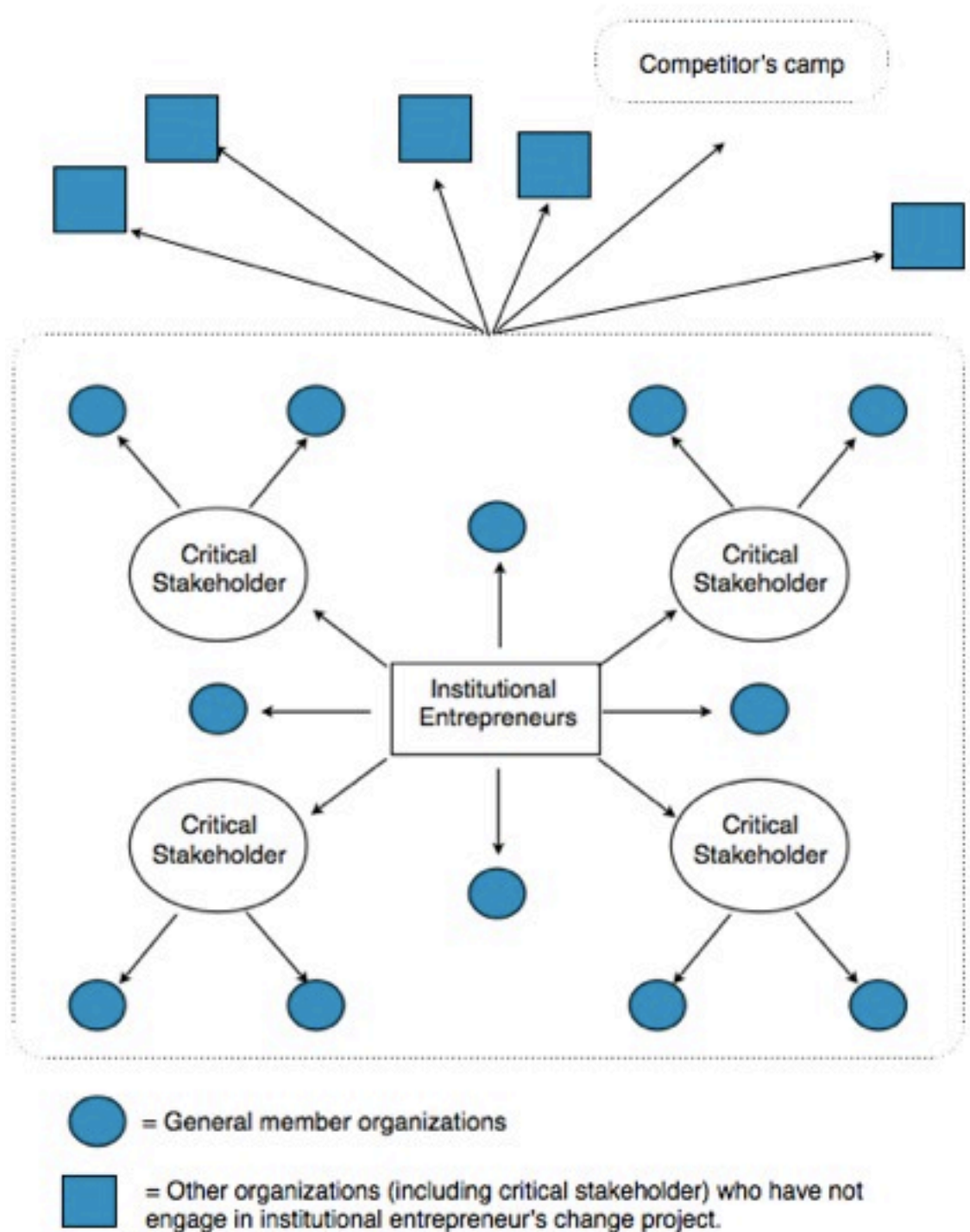
Institutional entrepreneurs need to manage both critical and general stakeholders by using collective action in standard wars. In this study, collective action includes critical stakeholder management and collaboration structuring capabilities. Collaborations can be viewed as professional associations within institutional entrepreneurship. The aim of such associations is to enact specifications of new institutions and diffuse them into their particular fields. In order to effectively manage the actions of member organizations within collaborations, institutional entrepreneurs need ‘collaboration structuring capability’, which will establish a set of membership rules in order to assign and manage responsibilities and obligations. Institutional entrepreneurs need to cooperate with their partners, and align and adjust their interests and actions. To summarize, studying the role of collaboration in institutional entrepreneurship will demonstrate the role of collective action. In the case of the standard war between BD and HD DVD, Sony had very intensive relationships with both Panasonic and Phillips. They not only co-developed the blu-ray disc technology, but also initiated critical issues and co-managed the BDA. These three companies can therefore be seen as a hardcore group² in the BDA. This study will discuss them as part of the group of critical stakeholders in this standard war. Appendix 3 discusses further the role of the hardcore group.

² This study suggests that a hardcore group is a central or fundamental group and usually enduring group which forms a loyal faction. This study will count the group as a critical stakeholder.

Membership rules play three critical roles in institutional entrepreneurship: sharing and exchanging resources, professionalisation and the maintenance of legitimacy. Moreover, institutional entrepreneurs use specialized practices for critical stakeholders. By doing this, such critical stakeholders maintain routines, procedures, and structures that show who can legitimately make decisions or speak on behalf of the collaboration. On the other hand, institutional entrepreneurs use generalized practices for general stakeholders in collaborations. By doing this, the strength of the general stakeholders' resources, knowledge and efforts is combined to reach a goal shared by all parties. As a result, group structure (membership), commitment (from all partners), and communication are the three elements of collective action. In addition to the first two, institutional entrepreneurs use communication to link people together and create relationships. In this way, collective action can be conceptualized as a set of communicative practices which take into consideration interactions between, and engagement of, people.

Whereas Figure 1.2. illustrates the internal interactions in the standard war alliance which are mobilized by the institutional entrepreneur, Figure 1.3. shows the activities of the entrepreneur and the allied group, including critical stakeholders and general member organizations, directed towards external actors. Institutional entrepreneurs mobilize their resources in cooperation with other internal 'stakeholders' in order to make the public understand the new technology and convince them that it is superior to the competing standards. Throughout this process, the group targets other organizations and critical stakeholders who have not engaged in their projects. Because of this, the group is able not only to influence public perceptions and understanding, and to recruit new members, but also to undermine those competitors who are proposing alternative new technologies and engaging in institutional entrepreneurship themselves.

Figure 1.3 The relationships between institutional entrepreneur's group, potential organizations, and competitor's camp



These activities towards the external actors are mainly discursive, although efforts to attract new critical stakeholders also may involve the provision of incentives in the form of more tangible support. This study suggests that skills which enable the

implementation of discursive strategies by communicating information and constructing the meanings of new technology are crucial assets for institutional entrepreneurs. By using discursive activities, institutional entrepreneurs are capable of both convincing the public to adopt their new technologies and undermining the proposals of their competitors. Hence, the third sub-research question is:

3. How do institutional entrepreneurs manage all external groups and internal group members by using discursive activities in technological standard change processes?

Managing discursive activities and discussing the discursive activities used in technological standard change processes is another contribution to research of this study. As the discussion in the previous section argued, social movement and technology management studies have discussed framing and discursive activities separately. Existing standard war studies do not pay enough attention to this issue. The major task of framing is to establish and sustain agendas in the audience's mind. The eventual goal is to change their minds and motivate them to adopt specific actions. These agendas aim to retain and sustain the influence of discourses in the audience's mind. However, existing empirical studies fail to identify the focal firms or actions which are used in standard wars. Based on this sub-research question, this study will further show which discursive activities can be used in standard wars.

However, a few conditions should be taken into account. Firstly, using discursive activities with internal group members does not contradict the function of communication in collective action. Having communication in collaborations can

ensure the establishment of cooperation and coordination among group members. Using discursive activities can also further enhance their commitment in standard wars. However, enhancing the commitment of internal group members is a side effect of using discursive activities in standard wars. By using collective action, group members to some extent have understood and endorsed the collaboration's marketing campaign and other ongoing plans. In a sense, their commitment has been increased. Thus, the study defines the audience of discursive activities as an external group.

Secondly, this study does not ignore the role of the media in standard wars. This study defines external groups as the media, leading users, the general public and potential partners (including the partners of competitors and independent stakeholders). Institutional entrepreneurs use discursive activities to influence the perceptions of lead users and then to further affect the rest of the public through those lead users' connections. They use such activities to influence the perceptions of potential partners and then further motivate them to engage in their collaborations. Institutional entrepreneurs also use these activities to influence the media. Hence, the media may report press releases which give favorable reports of specific standards. In particular, the media also plays a mediating role in which institutional entrepreneurs use discursive activities to influence these internal members and external groups. Although the research question does not mention the role of media, the study does not ignore it.

Finally, the competitor's group is part of the external group. The sub-research question mainly points out that institutional entrepreneurs can motivate competitors to engage in their own collaborations by using discursive activities. However, in practice, interactions with them are not only discursive, but include other aspects, including

financial incentives. However, there is a limit to the amount of information which can be accessed in order to analyze and triangulate the data. Although this aspect is not included in the research sub-questions, I will include it as part of the answer to the overall question.

To summarize, this study proposes three sub-questions based on the main research question. As well as its research into collective action, studies of critical stakeholder management and discursive activities are the main contributions to research of this study. The study will demonstrate the importance of critical stakeholders and discursive activities. Further, it will describe the practices of critical stakeholder management and discursive activities used in standard wars. These are the main contributions of this study.

1.3. The Case Study

In order to answer the general research question and the three sub-questions, this study examines the standard war between Sony Blu-ray Disc (BD) and Toshiba HD DVD from 2002 to 2008 as a critical case exemplifying the nature of a standard war in a mature field.

BD and HD DVD are standards of optical storage which arose from the previous standards, Sony's MMCD and Toshiba's DVD and SD during the 20th century. Two previous standard wars constitute important historical preconditions for the BD versus HD DVD standard war. They are incrementally developed from these previous standards. In the 1980s, Sony promoted the Betamax standard which was defeated by

JVC's VHS, and, in the 1990s, Toshiba SD defeated Sony MMCD. Toshiba held the leading position in the DVD standard until the standard was between BD and HD DVD standard in 2002 when Sony was the challenger. Both firms gained valuable experience of standard wars within the industry. Both firms used collaborations (the DVD Forum and the Blu-ray Disc Association, BDA) and utilized discursive media activities in this standard war. This study therefore claims that the BD-HD DVD standard war is an appropriate case to study in order to answer the research question. The BD-HD DVD case is useful for exploring the role of institutional entrepreneurship in standard wars for three reasons. Firstly, it is an intrinsically interesting case. It concerns a standard war in a mature technological field with well-established institutions and well-converged actors. Few previous studies have studied standard war in such mature ecosystems. Secondly, it is a critical case in the sense of a 'least likely case' in relation to showing the importance of an institutional perspective as a complement to a functionalist perspective. There seems to be far more room for institutional entrepreneurship in case of a newly developed technology with emerging institutions and actors than in the BD-HD DVD case characterized by an already fully developed institutional field with established institutions, roles, actors and institutional logics. Emerging fields have unsettled sets of principles to follow. The innovations in this field are more likely to be radical or not on a settled trajectory. The chosen case, on the other hand, is a 'least likely' case for showing the need for complementing the functionalist case with an institutionalist perspective. Thirdly, it echoes the importance of the network effects and collective action which have been discussed in the relevant previous studies. Fourthly, it highlights the role of communication, the ability to respond to problems and the construction of an identity for their new standards to stakeholders and markets. Fifthly, it also explicitly highlights the importance of power, legitimacy and discursive

activities, as they have been discussed in institutional entrepreneurship studies during this period. Sixthly, although the case is unique and radically different from most other standard wars, there are opportunities for generalizing the concrete conclusions from the study. The thick description makes possible naturalistic generalization to other similar contexts, including mature and emerging fields.

In conclusion, the case is a critical case that provides an opportunity to look at how institutional entrepreneurship perspective complements a functional perspective to understand standard wars. The case relates to the most important issues covered in other studies of standard wars, and, furthermore, although the concrete findings in this unique case are not directly relevant in other standard war contexts, there are possibilities for naturalistic generalization because of the thick description of the case.

The functionalist's perspective has dominated the relevant studies of standard wars several decades. This suggests that the focal firm can defeat its competitors in standard wars by having greater network effects and better product performance. However, this viewpoint ignores the contribution of institutional theory to understanding the process and outcome of standard wars. We can define standards as institutions. A standard has the characteristics of rules, norms, and beliefs. In this study the firm is seen as an institutional entrepreneur and its behavior analysed in line with institutional theory.

In order to verify the role of institutional theory in explaining a standard war, this study uses critical case study to do so. In a sense, critical case means 'if it is valid in this case, it is valid for all cases'. So, if we can find a critical case which can verify the

importance of institutional theory in standard war, this general finding can be generalized to all other cases.

The BD and HD DVD standards are incremental innovations originating from the previous standards. The main players have a pretty clear understanding of the context, who the other main actors are, what their priorities and competences are, and what to do about it. Sony and Toshiba can relatively easy forecast the expectations of the other players in the standard war. In other words, the BD case takes place in an institutional field where the relevant players are well-converged and the overarching sets of principles in the field have been identified and are well known. Furthermore, the case is not only mature in the sense of an established institutional field. It also concerns a mature technology. Both competing standards can be expected to be the last optical media standard based on home theater technology, which will be replaced by constant streaming and/or server based entertainment storage and playback, like cloud computing. Although it is expected that the functionalist's approach can explain such a standard wars well, this study represents an attempt to show that institutional entrepreneurship can add valuable insights in addition to the functionalist perspective.

By providing a thick description of the case, my case and findings can give other readers the means necessary for adapting the conclusions from this study to other studies of standard wars (naturalistic generalization). To apply thick description means to study the case as comprehensively as possible. I not only use different data sources to triangulate a finding, but I also provide rich information relating to the case to make it possible for other researchers to relate the findings to their own cases and possibly transfer or adapt part of the conclusions from this study. Thus, other researchers should

be aware of the differences between the study in question and my study but if this is so selective generalization of the findings is possible.

1.4. A Brief Presentation of the Case

In March 2008, Toshiba announced that they would no longer produce hardware and software for the HD DVD standard. The announcement terminated the standard war with Sony's Blu-ray Disc which had lasted since 2002. Although Toshiba possessed the DVD standard and leading position in the DVD Forum, an international consortium of hardware, software, media, and content companies that use and develop the DVD standard, Toshiba's HD DVD standard still could not obtain sufficiently wide support from content providers. For Sony, the victory in this standard war could be seen as a sweet revenge. Sony lost the previous standard wars concerning media devices to JVC's VHS in the 1980s, and Toshiba's DVD in the 1990s. The BD standard gave Sony and other leading partners a chance to dominate the development of optical storage devices.

Having gained experience from previous standard wars, Sony understood wide support, network effects and other tactics to be critical factors when fighting a standard war in the optical storage device industry. But, Toshiba had similar experience and stressed the same factors in more or less the same ways.

Firstly, both camps perceived the Hollywood studios to be critical stakeholders because, using their pre-recorded products, Sony and Toshiba could increase the network effects of their standards using these complementary products. As a result, both Sony and Toshiba aimed for Hollywood's support. Toshiba invited them to engage in the DVD

Forum and to take part in the development of the HD DVD standard. Sony established a Blu-ray Disc Association and also invited Hollywood to take part in it. In this standard war, both camps tried to persuade Hollywood studios to exclusively support their own standard.

Secondly, both camps used game consoles as the main medium through which to promote their disc players. Sony produces an outstanding game consoles series, PlayStation (PS). In 2004, Sony decided that it would use PS3 (PlayStation 3) to promote BD players in this standard war. The previous version of PS, PlayStation 2, had a widely installed base in the market. Using the PS3 as a trojan horse, the network effects of the BD standard could be increased not only by Hollywood movies but also by games software. Toshiba did not have any game consoles but decided to choose Microsoft's Xbox 360 to promote the HD DVD standard. In 2005, Toshiba invited Microsoft to engage in the DVD Forum. Toshiba also announced that they would allow users to copy the content of discs onto their computers and their home network. Microsoft wanted to use HD DVD players to dominate the home entertainment market by using their operating system (Windows). However, this announcement was in opposition to the interests of Hollywood studios. Moreover, the Xbox 360 was not integrated with HD DVD players. In other words, although consumers could now buy an HD DVD players module for the game consoles, the final price of this was more expensive than that of the PS3.

Thirdly, both companies realized that a copyright protection mechanism was one of the critical aspects of the optical storage device standard. At the beginning of the standard war, both companies announced that they were adopting the Advanced Access Content

System (AACS) as their copyright protection technology. This was because it is critical for Hollywood studios to protect the copyright of their content, and to therefore be able to secure their sales revenues. In fact, Sony had believed that its copyright protection technology was better than that of Toshiba in the SD-MMCD standard war, but, at that point, many stakeholders had forced Sony to integrate with Toshiba's MMCD standard. In turn, Sony announced in 2007 that the BD standard had adopted an additional technology, called BD Plus (BD+), which included additional copyright protection technology. This announcement met the expectations of many Hollywood studios. In addition to this, Toshiba and Microsoft announced that they would allow users to copy disc content onto their PC and home network in 2005. The announcement not only made Hollywood studios question the safety of the HD DVD standard but also gave a tactical opportunity to the BD standard. Consequently, after this announcement, many Hollywood studios announced that they would participate in the BDA and inclusively or exclusively support the BD standard. After the introduction of the BD+ technology, these studios further confirmed that the BD standard was better than HD DVD.

Toshiba had the leading position at the beginning of the standard war, because they claimed that the HD DVD standard could be manufactured cost-effectively. The HD DVD standard was seen as an upgraded DVD standard. It had lower storage capacity but cheaper manufacturing costs, while the BD standard had greater capacity but higher manufacturing costs. As a consequence, most Hollywood studios and manufacturing companies initially supported the HD DVD standard. Moreover, the HD DVD standard was generally compatible while the BD standard was not. In other words, Toshiba wanted to retain its advantage of the DVD standard and also to further dominate the

new optical standard. In turn, before their engagement of Microsoft, Toshiba had the support of more Hollywood studios and also participated in the DVD Forum.

At the same time, Sony invited more and more companies with diverse backgrounds and opinions to be part of the new standard. In 2002, Sony established the BDA forerunner, Blu-ray Disc Founders (BDF), which included Hitachi, LG Electronics, Matsushita, Pioneer, Royal Philips Electronics, Samsung, Sharp, Sony and Thomson Multimedia. Moreover, at the same time, the BDF announced that they were releasing the primary version of the BD technical specification. Before the BDA was officially established in 2004, Sony further invited HP, Dell, JVC and TDK to participate in the BDF. At that point, the BDF consisted not only of consumer electronics manufacturers, electronics equipment manufacturers and content providers, but also PC companies and disc manufacturers. Although the Toshiba camp had the endorsement of the whole DVD Forum, its consortium had split up, because most of the founders of the BDF were also member organizations, or even on the Steering Committee, of the DVD Forum. Moreover, Toshiba had initially chosen NEC as their main partner. NEC is a leading electronic equipment manufacturer, but not a leader in consumer electronics.

During the period between 2002 and Q1 2005, the BD and HD DVD camps were engaged in a struggle to develop the optical storage device standard which would be strongest from both a technical and an economical point of view. At the same time, Sony announced that it would integrate PS3 with BD players. When this information about PS3 was unveiled, some analysts and news reports said that it would have a big impact on the HD DVD standard. Some Hollywood studios began to waver between the

BD and HD DVD standards. After Microsoft's engagement in Q2 2005, the announcement encouraged these studios to move away from the HD DVD camp.

A critical event also took place that demonstrated the importance of news reports in the media. In January 2007, the *New York Times* reported that HD DVD had been hacked by an individual who identified himself as Muslix64, demonstrating that the BD standard's content protection mechanism was better than that of the HD DVD. Although the BD and HD DVD standards had both adopted AACS's encryption mechanism, the BDA used an additional software-based component that made it possible to modify the copy protection scheme on new discs if the existing one was broken by hackers. Muslix64 posted a demonstration of his hacking on the YouTube which has since been viewed many times. He identified a file which was the key to decrypting AACS protected movies and claimed that, if users could hack this file, this meant anyone could decrypt HD DVD movies. As a result, the legitimacy of the HD DVD standard was undermined by its weakened encryption system, and it lost the support of the Hollywood studios. This may also have caused some consumers to support the BD standard, and may have given the BDA an advantage by allowing it to offer a wider range of content.

However, after news of the hacking had appeared in the *New York Times*, Paramount and DreamWorks announced that they had chosen to support the HD DVD standard rather than BD. Market said that Toshiba had offered them huge financial incentives, such as marketing support and cash payments. At this stage, the market share of HD DVD disc players was greater than that of the BD players, because of their cheaper pricing strategy. However, when unit sales of PS3 were included in the results for disc players, the share for BD was greater than that for HD DVD. The HD DVD standard's

network effects and product performance were much poorer than those for the BD standard.

A few days after Paramount and DreamWorks had announced their preference for HD DVD, the BDA's official website showed the comments of Michael Bay and Steven Spielberg about these announcements. The title of Michael Bay's comments was: 'Michael Bay Responds to Paramount's Decision: "No Transformers 2 for Me!'" The title expressed very clearly Michael Bay's unhappiness about the announcements. On the other hand, although Steven Spielberg did not use any emotive words, the website cited the statements of his spokesman, who claimed that Spielberg supported the BD standard.

These events highlight several elements of the BD-HD DVD standard war. Firstly, both Sony and Toshiba used their resources in the standard war to change and upgrade the DVD standard, and then to make consumers adopt their proprietary standard. Both Sony and Toshiba used their experience of previous standard wars to persuade Hollywood studios to adopt their own standard.

Secondly, both focal firms established or used collaborations to research and develop specifications of hardware and software for their standards. Sony used R&D activities to develop their higher storage capacity and their copyright protection mechanism (BD+), and to make their standard compatible with PS3. Although the storage capacity of HD DVD was less than that of BD, they put much effort into decreasing its manufacturing costs and speeding up its manufacturing processes.

Thirdly, both focal firms promoted their own advantages and undermined those of their rivals by using media communications (such as PR). They and their partners also used media marketing campaigns to promote their disc players, game consoles (Microsoft's Xbox 360 and Sony's PS3) and pre-recorded products. These promotions aimed to make other companies understand what they were doing, to persuade those companies and consumers to adopt the standard, and to increase the sales of their products.

Finally, Toshiba and Sony were able to use the DVD Forum and BDA to help them accumulate further R&D capabilities. With more companies engaged in collaborations and media promotions, their standards could further permeate these companies' networks with other companies. In turn, both BD and HD DVD could strengthen their influence in the relevant industries and markets.

In this way, both Sony or Toshiba established alliances with other companies in order to establish collaborations. The aims of collaboration are to make their standards reasonable, and to strive for understanding, acceptance and exclusive support from the target market. In order to achieve the goals of change projects, institutional entrepreneurs increase their use of collective action and apply strategies for establishing continuous interaction with other organizations in order to create new institutions.

Rather than focusing on how firms apply institutional entrepreneurship by leading other member organizations successfully according to deliberate strategies, scholars studying organizational institutionalism pay more attentions to how this happens as a by-product of the organization's daily routines and practices. Institutional entrepreneurship is not seen as a sequence of predetermined well considered actions by a 'heroic agent'. It is

rather a capacity for constant adaptation to new circumstances in an ongoing complex process with competing institutional logics and where unpredictable events happen all the time. Also, human beings have 'bounded rationality' so even in a field with only one dominant institutional logic, it does not mean that there is no any possibility of which the unexpected events will not happen.

1.5. Research Method and Data Analysis Procedures

In order to answer the research questions, this study uses a critical case study method to respond to the research questions, and to construct a new theory which will explain how institutional entrepreneurs use institutional entrepreneurship to become the dominant participants in processes technological standard change. The study uses the standard war between BD-HD DVD as its single case study. It systematically compares and contrasts the BD and HD DVD standards throughout the whole standard war. Although this is a single critical case, it reflects many key elements of other studies of standard wars and institutional entrepreneurship and it might make naturalistic generalization to other similar contexts. The case also highlights the role of critical stakeholders throughout the change process and shows how different (tangible and intangible) resources of institutional entrepreneurs may lead to the use of different strategies throughout institutional change processes.

In order to analyze the case, I collected media reports, official technical documents, the archives of official websites, databases and the annual reports of the focal firms, and also conducted several interviews with a Sony manager and with media journalists. Due to the limited data on the HD DVD website (including data about the standard war and

the interviewees), I used a large quantity of media reports and other complementary data in my analysis. Due to the nature of Japanese culture, Toshiba people did not agree to be interviewed about this standard war. For this reason, I could not access any useful information from Toshiba's 2003-2008 annual reports, and I also could not interview any member of the senior management team in Toshiba. I collected a large quantity of media reports and complementary data, in order to research Toshiba's actions in this standard war. Many expert opinions, reviews and analyzes can be found in the reports generated by journalists working in the media. Having a large number of media reports and complementary data allowed me to understand Toshiba's actions in this standard war.

The study uses Eisenhardt's (1989) principles as its theoretical basis. Eisenhardt's empirical studies using these principles have been published in many first-tier academic journals (e.g. *Administrative Science Quarterly* and *Academy of Management Journal*). However, these principles do not suggest any appropriate way of analysing the data. In order to ensure credibility, transferability and dependability (Gill, Johnson, & Clark, 2010), the study borrows the technique of open coding to analyze the qualitative data. In general, I have disaggregated these media reports into smaller units and materials by using open coding.

Within the data analysis, further questions and viewpoints emerged from the open coding stage. More research was therefore undertaken to answer them, which used official documents concerning the standards, archives of the official websites, sales figures and figures for market share found in the Datamonitor and Euromonitor databases, company profiles from these databases and the focal firms' annual reports. I

also used my primary findings to construct questions which I used in an interviews with my informant at Sony's head office in 2009 and with a journalist. My informant is a general manager in Sony's BD division who was involved in the entire standard war. The journalist works for the *New York Times* and specialized in consumer electronics during the period of this standard war. This data analysis procedure enabled me to satisfy the reliability and validity of this case study. In addition, the procedure is also satisfied in the criterion of triangulation.

1.6. Structure of the Thesis

Chapters 2 to 4 of this study are the literature review. Chapter 5 presents its conceptual framework. Chapter 6 gives the research methodology. Chapter 7 presents the final findings based on chronology. Finally, Chapter 8 contains the conclusions, discussions and limitations of the findings, and also proposes the implications for future research.

Chapter 2 focuses on the definition and attributes of standard wars and reviews the relevant literature. The relevant literature is organized into rational versus social accounts. These two accounts represent different approaches to understanding standard wars. Besides, this study highlights the role of stakeholders, which has been paid less attention to many empirical studies of standard wars. Furthermore, this study distinguishes stakeholders by their criticality for the focal firms. This chapter will also demonstrate how the study's discussion of critical stakeholder management and discursive activities is one of main contributions to research. The section will discuss the profile and criticality of stakeholders as well.

Chapter 3 focuses on institutional change. Before standardisation, new technological standards can be seen as prototypes of institutions (Lawrence, Hardy, & Phillips, 2002). They are narrowly diffused and weakly entrenched. Once these prototypes are successfully institutionalized into fields, they can be seen as institutions. In this way, standard wars can be seen as processes of institutional change and institutionalisation.

Chapter 4 focuses on institutional entrepreneurship, and suggests that institutional entrepreneurship and entrepreneurship both aim to increase economic returns. However, institutional entrepreneurs aim at achieving economic returns by changing existing institutions, whereas traditional entrepreneurs propose new technologies within current institutions. This chapter develops organizational institutionalism studies to show that power, legitimacy, collective action and discursive activity are the attributes of institutional entrepreneurship.

Chapter 5 presents the conceptual framework derived from the literature review. This chapter not only proposes the framework but also the guidelines for each variable. These guidelines determine which information should be collected in the dataset, and derive from the research framework. In general, the power and legitimacy of institutional entrepreneurs can be seen as being resources. They have mutual relationships with collective action and discursive activity, which are at the heart of institutional entrepreneurship in standard wars. Effective collective action and discursive activity therefore lead to product performance and network effects. This study also finds that effective product performance will also produce network effects.

Chapter 6 describes the research methodology. This study uses a critical case study method and builds a theory from the analysis of the BD-HD DVD case. The BD case shows that the functional perspective cannot explain standard wars alone but has to be complemented with an institutional entrepreneurship perspective, even in case of standard wars in a mature field with well established institutions, actors and institutional logic(s). The BD-HD DVD case is a critical case for showing the importance of an institutionalist perspective in the sense that ‘if it is so in this least likely case it is also so in other more likely cases’ Thus, as it is shown that the institutional entrepreneurship perspective is needed in order to explain an incremental innovation embedded in a mature field it can be concluded that the institutional perspective is also important, and probably even more so, in case of standard wars in other less mature technological fields. Apart from this general conclusion, it is of course not possible to generalize the concrete conclusions from this study directly to other standard wars. The BD-HD DVD standard war took place in a mature ecosystem. It is unique and extreme in this respect. However, the thick description of the case makes possible naturalistic generalization to other standard war contexts, including radical innovations embedded in emerging fields. Besides, I adopt the principles outlined in Eisenhardt’s (1989) article: *Building Theory from Case Study Research* as the basis for this qualitative study. Eisenhardt constructs rigorous principles which respond to issues of validity and reliability in the case study method. This study applies these principles in the design of its practical strategies. Research information and data are sourced from various content providers including *New York Times*, *Wall Street Journal (Eastern Edition)*, *Financial Times*, *San Jose Mercury News*, *The Economist*, *BusinessWeek* and many trade publications, official documents (downloaded from bluraydisc.com and dvdforum.org), market reports (DataMonitor and Euromonitor), patent data statistics (World Intellectual Patent

Organization, WIPO), and the annual reports of the focal firms (Toshiba and Sony). In order to satisfy the quality requirements of qualitative studies, I employed the systematical analysis procedures of open coding to analyze the entire dataset.

In order to clearly describe and analyze the standard war between BD and HD DVD, I divide the whole analysis into two parts. Chapter 7 presents the findings of the study whereas the process of data analysis by means of open coding is documented in Appendix 3. The appendix outlines: (1) the concepts included in a variable; (2) the definition of each concept; (3) how the concept is analyzed using the dataset; and (4) the definitions of the relationships between variables.

Chapter 8 has five sections. The first section will show how the findings elaborate the original theoretical framework. The second section will present the new theoretical framework. The third section will discuss the analytical propositions of the study, and compare and contrast it with previous studies, including studies of standard wars and of institutional entrepreneurship. The fourth section will discuss the limitations of the study. Finally, the fifth section will outline future research. I propose that the changing practices of institutional entrepreneurs in a configurational approach, and the role of social capital in institutional entrepreneurship have the potential to be subjects of future research.

Chapter 2. Standard Wars

2.1. Introduction

Traditionally, studies of technology have focused on its physical characteristics. Such studies view technology as a system comprising components and connections between them (Constant, 1980; Hughes, 1983). More recently, scholars have considered technology to be socially constructed (Pinch & Bijker, 1987). It is recognized and protected as a property right through the institutions of royalties or patents (Nelson, 1996), and has social and economic meanings when it is created to serve a specific functional need (Thirtle & Ruttan, 1987).

Technology is a complex artifact, which evolves in the form of a nested hierarchy of technology cycles (Murmann & Frenken, 2006). A complex technological artifact can include non-assembled products, simple assembled products and complex systems (Utterback, 1994; Tushman & Rosenkopf, 1992). A non-assembled product has no separable components (e.g. screws), while a simple assembled product is made from a few simple components and sub-systems (e.g. hard disk drives). A complex system, however, is made of a set of technological sub-systems connected to each other through specific interfaces (e.g. personal computer, laptop etc.). When a firm decides to design a complex technological artifact and successfully standardizes it, “the greater is the number of actors needing to be aligned for a technological design to achieve dominance and thus the more complicated the sponsoring role becomes” (Suarez, 2004: 275). In a complex technology, standards represent interface specifications that dictate how different components combine to provide utility to users (Garud & Kumaraswamy,

1993). In short, a complex technological artifact requires standards in order to coordinate different components in a unified way.

In modern economies, a standard performs a variety of functions. It provides compatibility between products or systems. It may serve to enhance technology or final product quality. It may reduce variety and promote the understanding of a technology by providing information (DTI Economic Paper, 2005). These statements echo the idea that standards also have system and knowledge characteristics (Murmam & Frenken, 2006). The system characteristic has led to increases in the number and variety of specifications which affect industries and markets. The knowledge characteristic has led to increases in the property rights and potential economic value of standardisation when companies sponsor their own new technologies as dominant designs in given fields. Furthermore, this study suggests, that standards also have stakeholder characteristics. This is a protocol (Liebowitz & Margolis, 1990) that constitutes and typifies the interests of different stakeholders about common problems. In order to successfully develop a standard, the focal firm should strike a balance between the requirements of different users, such as critical manufacturers, consumers, main retailers and so on (Tassey, 2000).

This study defines a standard as a “set of specifications to which all elements of products, processes, formats, or procedures under its jurisdiction must conform” (Tassey, 2000: 588). Technical/technological standard³ are known as

³ Standards have been categorized on the basis of several distinctions, such as technical and non-technical standards and process and outcome standards (Brunsson, Rasche, & Seidl, 2012). This study only focuses on technical standards. Scholars (Brunsson et al., 2012) indicate that these different types of standards have common characteristics. In general, standards have attributes of institutions while standardization have attributes of institutionalization. This study will further illustrate this viewpoint in the following sections and chapters.

compatibility or interface standards (David & Greenstein, 1990). Such standards are aimed at ensuring compatibility and interoperability among the components of a technological system (Tushman & Rosenkopf, 1992). Either technical or non-technical standard, a standard is one of the key elements of an industry, and represents specifications which dictate the ways in which different components of technological systems work together for the benefit of users (Garud & Kumaraswamy, 1993). A standard has to be agreed before users exchange and evaluate products in the marketplace (Garud & Rappa, 1994). A successful standard should, if possible, be a response to all these evaluations and to all the requirements of users. If this is so, when the standard is unveiled in the marketplace, it will obtain the support of users to as great an extent as possible.

Successful standardization can help a new technology to be locked into markets. As a result, the focal firm can earn a considerable economic return. A standardization process is also a socio-political process designed to reach agreement between divergent stakeholders in a particular industry. When a focal firm is promoting a new technology, it should possess sufficient skills to justify its plans, when presenting its considered plan concerning how it would alter the current standard. This plan should present compelling reasons and also motivate other organizations to engage with it for change (Fligstein, 1997; Hargadon & Douglas, 2001; Garud et al, 2002; Kaplan & Tripsas, 2008; Ozcan & Eisenhardt, 2009). Within this process, several competitors are likely to emerge, who will propose alternative plans. In such a case, the focal firm has to compete with a number of other firms until one new technology emerges as the victor (Clark, 1985). This process is known as a ‘standard war’.

The outcomes of standard wars often determine which technologies succeed and which fail, and also determine the fate of the firms that sponsor them. These outcomes also determine the fate of a number of complementary goods and services which are offered around each of the competing alternatives, deciding which succeed and which fail. In standard wars, founder firms and participants have mutual relationships. They cooperate in researching and developing new specifications and many other activities in connection with the standards they promote.

Standard wars bring both benefits and risks to founder firms and participants. A new standard may refine the trajectory of a particular technology. At the same time, new standards shape the problem-solving techniques which are used in that industry. This results in an adhesive technological paradigm which influences future technological inquiry in the field (Dosi, 1988). When founder firms successfully standardize new standards in a particular field, the standards adopted usually generate considerable revenue for them. As a result, they have leading advantages. These advantages can lead them to explore new opportunities so that they can further develop and refine the technologies in the future (Schilling, 2002). When a standard is widely adopted, complementary products are often developed which specialized in order to operate alongside this standard. The participants who can manufacture these complementary products can also earn considerable revenues. These effects constitute positive feedback, which results in a reinforcing mechanism. When positive feedback is strong enough, firms with dominant designs in network industries may foster winner-take-all scenarios. A single product and its founder firm can lock in the entire market for a given product or service.

On the other hand, one risk of developing a standard is technological lock-out (Schilling, 1998). A firm may be technologically locked out because the standard is rejected in favor of a competing standard. It will also be locked out if it is unable to develop products which are compatible with or superior to the existing standard in the market. When there are many different competitors in a market, they make an effort to invest resources and achieve their final goals. This is because the loser of such a competition will waste valuable resources and may own redundant technologies.

The outcome of a standard war cannot be understood by looking at the role of the founder firm alone. It is rather the case that dominant designs emerge from a process of negotiation among founders and relevant firms, social groups, institutions, and regulatory actors (Anderson & Tushman, 1990; Rosenkopf & Tushman, 1994; Suarez, 2004; Tushman & Rosenkopf, 1992; Van de Ven & Garud, 1993). Standard wars should therefore also be viewed as inter-organizational processes (Hargadon & Douglas, 2001; Hargrave & Van de Ven, 2006; Van de Ven & Hargrave, 2004; Ozcan & Eisenhardt, 2009).

Scholars have adopted many perspectives to explain the emergence of one dominant technology over several competing ones. They have identified different factors, such as the technological characteristics of the product (Tushman & Anderson, 1986; Christensen, Suarez, & Utterback, 1998); the firm's resources and capabilities (Klepper & Simons, 2000; Prahalad & Hamel, 1990; Schilling, 1998; Shapiro & Varian, 1999; Suarez & Utterback, 1995); density, entry/exit rates and the industry life cycle (Christensen et al., 1998; Klepper, 1996; Hunt & Aldrich, 1998; Rosenkopf & Tushman,

1998; Van de Ven & Garud, 1993; Wade, 1995); and the role of institutional actors (Scott, 2008; Garud & Karnøe, 2003).

Moreover, this study also examines the role of stakeholders in standard wars. Surprisingly, this perspective is not explicitly covered in most earlier studies of standard wars. However, it is not difficult to uncover their influence in previous studies. For instance, Sony's SD and Toshiba's MMCD engaged in a standard war in the 1990s. At the time, IBM and other PC companies played the role of stakeholder, requesting that Sony and Toshiba combine their own standards into one. Consequently, Toshiba's MMCD was victorious, and their new standard is the DVD standard. However, less attention is paid in the relevant studies to the issue of stakeholders. The previous section suggested that focal firms should strike a balance between the requirements of users, such as critical manufacturers, consumers and main retailers, among others in order to reach agreements. As a consequence, this study claims that this issue should be included in a new theory of standard wars.

Further, the various perspectives can be categorized into two overall approaches: rational versus social accounts (Ansari, Fiss, & Zajac, 2010). These two accounts provide different approaches to studying the process by which a standard become the dominant design by means of increasing diffusion and adoption of new technologies. The former account has roots in economic literature and build on the rational actor model. Rational users are more likely to adopt a new standard in case, of greater network effects, better product performance, and rational strategies of focal firms are directed towards aiming for such outcomes. The effects of the variables in the rational account can be quantified. For example, this approach will calculate how many market

calculate indicators of better product performance than competitors (product performance).

In contrast, the social account has basic roots in sociological literature and focuses on the social embeddedness of actors. Based on this viewpoint, social actors' actions and behaviors are influenced by their families, colleagues, and so forth. Once more and more members of these communities have developed a favorable view of the new technology and adopted a specific technologies or products, they also typically adopt these technologies or products. These members embrace the strong-tie connections and have a certain degree of reciprocal obligations, intimacy, and emotional intensity (Granovetter, 1973). Their opinions and behaviors are difficult to quantify, the effects and numbers matter less. What does matter is how you make the markets believe that you have better product performance than your competitors. If you are successful in this respect you are capable of increasing network effects in markets and counteracting initial differences in adoption ratios.

Further, this study suggests that many variables relating to standard wars have the meanings of rational and social accounts at the same time. For example, network effects is a typical variable in industrial economic, which can be seen as related to the rational account. However, it does not only matter 'how many customers' having adopted the standard. In social accounts, perceptions and connections also influence the decision to adopt the specific standard or product. This chapter will compare the meanings of different perspectives in rational and social accounts.

The aim of this chapter is to suggest that focal firms must have sufficient skills and tactics if they are to compete with other firms in standard wars. I will use different perspectives to explain the nature of these skills. This chapter has several sections: Section 2.2 will discuss the benefits of winning standard wars, while Section 2.3 will discuss the risks of developing standard wars which initiate standards. The stand-alone value and network externality value of technology are generated by lock-in, increasing return and winner-take-all. These two values are major revenues for firms which win standard wars. Section 2.4 will discuss the factors which can influence standard wars. In general, this study will categorize the relevant literatures into rational and social accounts and compare their meanings. Section 2.5, derived from these perspectives, will identify four attributes of standard wars: framing, mobilizing collaboration, network effects and product performance. These four attributes constitute the essential characteristics of standard wars. In the end of the section (2.5.5), I will present the role of these attributes in previous standard war studies. And Section 2.5.6. will review the relevant BD-HD DVD standard wars studies in SSCI database. Finally, Section 2.6 forms the conclusion of Chapter 2.

2.2. Benefits of Winning Standard Wars

Stand-alone and network effects can bring in considerable revenue when firms win standard wars (Schilling, 2002). In order to earn this revenue, focal firms should develop strategies to produce these effects. Firstly, by developing such strategies, focal firms can increase the network effects of new standards. When they can make new products comply with new standards, consumers will be keen to buy them. Secondly, stand-alone value depends on transactions. When the stock of popular items in a

particular location is almost exhausted, consumers are willing to pay more than the usual asking price, rather than spending time and effort to get it more cheaply elsewhere. Various factors may influence the stand-alone value, such as place, delivery, use, supplements, maintenance, disposal, and so on (Kim & Mauborgne, 2003). In this way, focal firms can develop strategies to make users to believe that the new standards are popular in terms of function, qualities, use and etc.

In general, network effects are created not only by the stand-alone benefits and cost of a technology, but also by the size of its installed base and the availability of complementary products. In standard wars, when a new standard is recognized to have major network effects, this value is even higher. Furthermore, if new standards have stand-alone value, they are seen as having performing better than their competitors. The discussion of network effects and stand-alone value reflects Suarez's (2004) view of the role of strategic manoeuvring in standard wars. Moreover, its performance is evaluated by stakeholders. When consumers compare the value of new standards with those of existing ones, they evaluate objective and subjective information. In order to make stakeholders believe that a new technology is better, according to Kaplan and Tripsas (2008), focal firms should communicate information about it and present an attractive image to them. To achieve this, focal firms should focus attention on their discursive activities. These discourses should not generate information asymmetry, as asymmetric information may impede standardization processes and prevent focal firms from winning standard wars.

2.3. Risks Involved in Developing Standards

The major risk involved in developing standards is technological lock-out (Schilling, 1998). This refers to a situation in which firms find themselves unable to develop or competitively sell products or services to a particular market because standards cannot be adopted (Schilling, 1998).

Two major problems exist which cause the market to reject standards: failure to generate network effects, and failure to respond to the expectations of stakeholders. According to a resource-based view, the core capabilities of a firm often give it advantages over a competitor (Barney, 1991). These capabilities include distinctive competencies (Hitt & Ireland, 1985; Snow & Hrebiniak, 1980); core competencies (Hayes, Wheelwright, & Clark, 1988; Prahalad & Hamel, 1990); firm-specific competence (Pavitt, 1991); resource deployments (Hofer & Schendel, 1978); and invisible assets (Itami & Roehl, 1987). These factors are said to be a set of capabilities which allow focal firms to be competitive in the marketplace. When firms invest in new technologies, they exploit, combine, and recombine existing knowledge and experience. This bricolage process means that focal firms can move from local inputs to higher degrees of functionality through gradual transformation (Garud & Karnøe, 2003). In this way, the absorptive capability of a firm plays a critical role. This capability may influence focal firms by increasing their future ability to assimilate information, acquire knowledge and develop technologies (Cohen & Levinthal, 1990). Failing to invest in absorptive capability may influence the ability of firms to develop new core capabilities. It also influences their ability to evaluate the importance and merit of intermediate technological advances and then to form more accurate expectations of their

commercial return. Thus, a failure of absorptive capability may mean that firms are unable to immediately or accurately respond to the expectations of stakeholders. This in turn may cause lock-out.

On the other hand, in network industries, conflicting with the expectations of stakeholders (mostly complementary product manufacturers) could lead to lock out. New technologies are not useful or desirable to customers if they are not associated with a set of complementary goods. Firms producing technologies for which there are no complementary products are likely to have their technologies rejected (Choi, 1994; Farrell & Saloner, 1985; Katz & Shapiro, 1986, 1994). Furthermore, the size of the installed base may influence manufacturers of complementary products. It will be more valuable to these stakeholders to support a technology with many users than one with few users. In turn, the availability of complementary products influences the technology adoption of consumers, and then further increases the installed base (Schilling, 1998, 2002). If providers of complementary products do not support a technology, or if these providers provide less productivity or lower quality price or performance, the founder firm may find that their new technologies are locked out of the market.

To summarize, winning standard wars may generate considerable revenue for founder firms. In Sections 2.1 and 2.2, I discussed the potential benefits and risks when firms initiate standard wars. These risks can also be seen as opportunities. These ‘opportunities’ can remind focal firms to pay attention to absorptive capabilities, network effects, and stakeholder’s expectations. Section 2.4 will review the relevant perspectives which can identify the attributes of standard wars.

2.4. Comparison and Contrast of Rational and Social Accounts

In general, we can view the purpose of a standard war as increasing diffusion and adoption of new technologies and/or products which are then becoming the dominant designs in a field. The relevant literatures can be characterized by two sets of explanations: rational and social accounts (Ansari et al., 2010). The rational account builds on the rational actor model and is rooted in the economic literature. The perspective conceives of adopters of new technologies and products as rational actors. They scan their environment and efficiently make their choices. It represents the most dominant perspective in the literature on diffusion of innovation (Rogers, 1995; David, 1985; Suarez, 2004, Schilling, 2002).

In contrast, the social account is more closely associated with a sociological perspective. The rational account suggests that the technologies and products adopted by rational actors are the effective ones. Hence, the weaker existing products or performers will tend to be weeded out. However, the social account addresses how social actors frequently imitate other actors' actions or are forced/influenced to adopt particular innovations for other reasons than efficiency reasons. This account points out that in order to achieve legitimacy and conformity with norms (DiMaggio & Powell, 1983; Tolbert & Zucker, 1996), social actors may sometimes adopt inefficient or even harmful innovations (Strang & Macy, 2001; Meyer & Rowan, 1997).

Although each account portrays social actors' behavior in standard wars in different ways, this study suggests that the two approaches are not exclusive. Rather, within all the reviewed perspectives there is research that study the evidence from either arational

or a social account. Thus, this study suggests that even though a seemingly unambiguous perspective (e.g. industrial economic and institutional theory) can be categorized into either rational or social account, they still also include the meaning of the other account.

The structure of this section will present the idea of each perspective. Then, I will further outline what the rational and social accounts involve in each perspective.

2.4.1. The Social Construction Perspective

The aim of this perspective is to try to draw other people's attention to the meaning of an object or action and possibly control and manipulate people's actions by such means (David & Strang, 2006; Oakes, Townley, & Cooper, 1998). In general, the perspective persuades and makes audience believe that the meaning of the object is better than the others by means of narratives. In a way, this perspective typically represents the social account. In contrast, some empirical studies use the budget spending in the media to measure the performance of social construction process. In this vein, this perspective includes some meanings of the rational account as well. The structure of this section will briefly discuss the role of social cognition in standard wars. Then it will briefly present the relevant empirical findings in each account.

This perspective suggests that the selection of technology occurs through a process of negotiation between relevant social groups and reflects the extent to which evaluation criteria are influenced in favor of the technology (Bijker et al., 1987; Kaplan & Tripsas, 2008). It involves a system of judgments as to which factors are important, how each is

measured, and how they are to be valued (Wojick, 1979). The characteristics of technology and its effects should be regarded as a product of human interpretation and negotiation between social groups, rather than a reflection of the inherent capabilities of the technology and of random technological breakthrough. In turn, standard wars can be seen as a socio-political process and a collective technological frame (Kaplan & Tripsas, 2008), which is produced by interactions between various agents.

The view of this perspective is that this frame plays a critical role in standard wars. The frame aims to influence the belief, perception and appreciation of the audience, as subsequent interpretations are filtered through all three of these factors (Barley & Tolbert, 1997; Hargadon & Douglas, 2001; Gilbert, 2006). Using framing, new technologies can be justified as indispensable, valid, and appropriate, or rejected, as not having these qualities (Rao, 1998; Kaplan & Tripsas, 2008). Framing also can help focal firms to motivate other organizations (including stakeholders), together with consumers, making them willing to become involved in the changing plan of the focal firm or to purchase a specific technology product (Fligstein, 2001; Wijen & Ansari, 2007). In short, the frame plays an important role in shaping the perceptions of stakeholders in a nascent technology.

This perspective has recently converged with a political approach to technology (Symon, 2008). The main viewpoint of the political approach is that groups of individuals with divergent interests are seen as wishing to influence the process of change, because they wish to make it beneficial to their own interests. Within this process, focal firms frequently take an active role in communicating, responding to, and dealing with the requirements of these groups. Focal firms can also convince group

members of their credibility. The literature suggests that senior management teams (O'Reilly & Tushman, 2007), strategic alliances (Kaplan & Tripsas, 2008) and founders of startup firms (Beckman, 2006) can all convince groups that they are credible and have the will to do some form of joint experimentation in standard wars. This study integrates the social construction perspective and the political approach, to argue that the political interests of stakeholders should be considered in standardisation processes (Symon, 2008).

All other things being equal, the greater credibility of the focal firm, the higher its likelihood of winning a standard war. For instance, in the 1990s, Sony successfully used their credibility to influence the perceptions of the market and then take Nintendo's leading position in the game console industry after launching PlayStation (PS) (Gallagher & Park, 2002). This case suggests that, using an interactive process, focal firms are able to move the industry towards a specific collective frame associated with a specific standard. Further, in the social construction processes, the role of stakeholders cannot be ignored. The stakeholder perspective suggests that "if we adopt as a unit of analysis the relationships between a business and the groups and individuals who can affect or are affected by it, then we have a better chance to deal effectively with these problems" (Parmar, Freeman, Harrison, Wicks, Purnell, & de Colle, 2010: 405). In this way, focal firms must convince different stakeholders that standard wars are necessary. Focal firms also have to convince these stakeholders that winning these standard wars can bring them considerable revenues (Freeman, 1984; Jones, 1995; Walsh, 2005).

The social construction perspective may present the typical meaning of social account. Focal firms should include narratives as part of their framing processes. They should be

capable of telling stories to develop their visions (Meyer & Rowan, 1977) and to make the visions attractive to a variety of audiences (Greenwood et al., 2002; Suddaby & Greenwood, 2005; Hartelius & Browning, 2008). Such storytelling is legitimized by the employment of well-established discursive activities in order to construct substantive patterns of imagery which lend coherence and meaning to plans and standards (Morrill & Owen-Smith, 2002). As a result, focal firms should have narrative capability, making them able to present particular events or practices in more trustworthy and general terms that will make them attractive to a variety of audiences (Morrill & Owen-Smith, 2002; Greenwood et al., 2002; Zilber, 2007).

On the other hand, some scholars suggest that focal firms can also have influence through the media and advertising (Pollock & Rindova, 2003; Gregan-Paxton & John, 1997). Generally speaking, this stream suggests that by spending a certain amount of marketing budget in the media, focal firms can enforce or reinforce their position in markets and promote their products. For instance, Rindova and Fombrun (1999) indicate that IBM reinforced its dominant position in markets by influencing the understanding of the industry structure and its competitive advantage. Lampel (2001) further indicate that focal firms may produce “technological dramas” in the media in order to influence the perceptions of the audience regarding a new technology. Often, these dramas take the form of product demonstrations and product announcements together. The focal firms have to spend budgets for advertising in the media. In this way, focal firms can influence how audience interprets the data and the categorization of the new technology in audience’s mind (Gregan-Paxton & John, 1997).

2.4.2. The Stakeholder Perspective

Many studies of standard wars have outlined the role of stakeholders but not given them the same level of attention as in empirical studies. This study suggests that the issue should be discussed separately and explicitly. Drawing on a stakeholder perspective, a corporation can be understood as a set of relationships among social groups, each of which has a stake in the activities which comprise the business (Freeman, 1984; Walsh, 2005). The actions and products of focal firms should be evaluated and approved by stakeholders or the behavior of organizations be influenced by stakeholders' actions and strategies. In this vein, this perspective represents a social account. However, the perspective is also used instrumentally in strategic management (e.g. Harrison, Bosse & Phillips, 2010; Fischer & Reuber, 2007; Puncheva, 2008) and marketing (Polonsky, Suchard & Scott, 1999), where it is used to calculate how much stakeholders management practices influence economic performance (including financial performance). Thus, the perspective can represent the rational account as well (Parmar, Freeman, Harrison, Wicks, Purnell, & de Colle, 2010).

The term 'stakeholder' is conceived more broadly than 'shareholder' or 'stockholder'. Scholars provide various typologies in order to understand the profile of stakeholders in environments. For example, according to Frooman (1999), a stakeholder is dependent on, or interdependent with, the focal firm through its resources. According to Mitchell, Agle and Wood (1997), a stakeholder has power and legitimacy; sometimes it may have an urgent claim. The stakeholders in a standard war are all the organizations involved, the government and consumers. Following these two definitions, agents of change face

many different pressures from different stakeholders. They will then be exhausted by responding to these various pressures on its power and legitimacy.

Economic performance is the primary dependent variable in the strategic management variant of the stakeholder perspective. This approach represents the rational account in this study. The relevant variables include financial performance, including shareholder returns, return on assets, and so on. In general, the empirical studies suggest that beneficial stakeholder relationships can enhance the wealth-creating capacity of the focal firm (Post, Preston, & Sachs, 2002a), allying with excellent reputational stakeholders are more attractive to potential business partners and customer (Fischer & Reuber, 2007), and allying with stakeholders can facilitate the formation of alliances and long-term contract (Barringer & Harrison, 2000). In this study, allying with an appropriate number of stakeholders can be seen as advantageous to focal firms in standard wars.

In contrast, some empirical studies in this perspective suggest that individuals tend to be susceptible to social influence, and habituated to tradition and societal expectations (Verbeke & Tung, 2013). This approach suggests that firms are social constructions, which operate within socially constructed limits (Oliver, 1997). In other words, this approach tends to encompass social justification and social obligations (Zukin & DiMaggio, 1990) and trigger public and regulatory pressures and industry wide rules, norms and beliefs to define or enforce socially acceptable behavior. In this vein, the this perspective of stakeholders shifts away from supporting resource heterogeneity towards seeking more homogeneity in industries. For instance, firms holding powerful buying capabilities and/or leading position in an industry may apply pressures on their buyers

or followers, and compel the latter to conformity with particular standards or products. In this vein, the influencing beliefs and enforcing organizations to adopt particular standards or products represents the social account in this study.

2.4.3. The Institutional Theory

Institutional theory is typically identified as representing the social account. This approach is used to focus on how subjective experiences, including routines, patterns of interaction, and social roles, become and appear as an objective reality. However, a few decades ago, this approach was used to trace the diffusion of a particular practice or structural features across a field of organizations. The core idea of this stream was to observe how organizations become more similar to each other as they respond to their common institutional context (DiMaggio & Powell, 1983). This stream draws from a functional epistemology (Suddaby & Greenwood, 2009), It defines the institutional contexts as stable environments and tends to identify measurable elements of organizations that change as a result of shifting institutional pressures. This represents a rational account. By contrast, the other stream is necessary to trace the values, norms, and ideologies underpinning the elements of organizations structure. Then, this stream suggests that the patterns of diffusion are the consequences of institutional dynamics. In this vein, although institutional theory typically seems to represent the social account, some empirical studies in this approach also includes the meanings of the rational account.

The discussion of institutional entrepreneurship is the heart of this thesis. They will be discussed in Chapter 3 and 4 in detail. Thus, this section will only briefly present each different stream.

Seen from the rational account, institutional theory can be described as the conditions under which organizations adopt practices (Tolbert & Zucker, 1983), enter new markets (Greve, 1995), engage in decoupling of activities (Westphal & Zajac, 1994), construct alliances (Garcia-Pont & Nohria, 2002), and so forth. For example, Haveman's study of mimetic isomorphism defines the dependent variable as the rate of entry into new markets by loan and saving organizations. Westphal et al (1997) measures the adoption rate of TQM (total quality management) practices by general medical surgical hospitals in the US from 1985 to 1993. This study defines the independent variable as diffusion of a practice. Thus, the number and adoption rate of the specific practice is analysed as the effect of institutions as independent variables in an approach representing a rational account. For example, the links between organizations (Davis & Greve, 1997), the role of professional networks (DiMaggio & Powell, 1983), the influence of particular organizations that act as benchmarks (Haunschild, 1993) have been defined as independent variables.

In contrast, the social account version of this perspective pays attention to the ways in which social actors apply meaning to institutionalized practices and structures. For example, a study of 'Kodak's moment' (Munir and Philips, 2005) views Kodak's main achievement in its standard war as the way in which they changed the meaning associated with the roll-film camera. Taking photo was viewed as a professional activity before Kodak initiated the new camera. However, Kodak successfully linked the camera

with the meaning of ‘holiday’. The study does not calculate the marketing budget spent in the media or the adoption rate of the product. Rather, they trace how Kodak used the discursive activities to put the new meaning of camera into audience’s head. Similarly, Maguire et al. (2004) examine the emergence of the Canadian Treatment Advocates Council (CTAC) and how to lobby pharmaceutical companies on treatment issues. They reveal how different types of power, associated with particular political skills for theorization, can be used by the focal firms to create new organizational forms and associated practices.

In summary, the two research streams represent two different accounts. The first stream represents the rational account and a functionalist epistemology while the social account focuses on the interpretive approach to understand institutions as emergent clusters of interactions among and between social actors.

2.4.4. The Industrial Economic Perspective

The pure economic viewpoint is based upon cost and benefit issues. The industrial economic perspective further suggests that each product represents a particular technological network, and that the benefits to users depend not only on the attributes of each product but also on the relative size of the installed base of each network compared to those of its rivals (Katz & Shapiro, 1985). Traditionally, this perspective has had a range of empirical studies suggesting the size of the installed base playing a critical role in standard wars. No doubt, the perspective represents the rational account. However, recently, some scholars try to revisit the network effects and bring the meaning of the

social account together (Suarez, 2005). This study will briefly introduce the findings in the aspect of rational account then discuss the findings in the other aspect.

Standards play an important role in new industrial developments. They allow producers to achieve economies of scale, and enable markets to carry out transactions in efficient ways (Tassey, 2000). Producers promote their technologies and strive for acceptance. In network industries, if none of a consumer's friends have a specific product, then that product is of little value to that consumer. According to this view, network effects (Rohlf's, 1974) form a critical variable in the industrial economic perspective. Network effects occur when the value of a product or service to a consumer is contingent on the number of people using it. This is true of such products as telephone networks, fax machines, railway networks, game consoles and so on (Farrell & Saloner, 1985, 1986; Katz & Shapiro, 1986, 1994). The perspective suggests that focal firms should develop strategies in order to generate, increase, and maintain network effects in standard wars.

Collaborations plays strategic roles in standard wars (e.g. Dranove & Gandal, 2003; Lawrence et al., 2002). Collaborations can help firms to secure supplementary resources, to increase production effectively, and to diffuse the products. Using the amount of member organizations and their network connections, the standard can be rapidly diffused to markets. For example, in 1996, the DVD Forum unveiled the specifications of DVDs (Dranove & Gandal, 2003). The DVD standard was defined as an open standard. Any machine carrying the DVD logo could play any DVD. All DVDs would be encoded with the Dolby Digital sound process and other sound processes, such as the Dreamworks DTS surround process. Before the DVD standard became officially available, Warner Home Video (and its sister companies such as HBO and

New Line), Columbia Tri-Star, MGM/UA and Polygram were already committed to producing DVD videos. Some studios reserved their support for DVDs because of concerns about the potential success of the technology and also because of fears of piracy. However, by August 1998, Universal, Disney, Paramount and 20th Century Fox were all committed to the DVD standard. In this case, Warner, Columbia and Polygram were collaborators in the DVD Forum. They developed and endorsed the new standard and then promoted it to the market. Soon afterwards, the DVD standard had been widely accepted in the market, regardless of the technological concerns of some smaller studios.

By contrast, in the social account version, researchers pay attention to the concept of strong-ties network effects as a key determinant of technology adoption in standard wars (Ahuja, 2000; Rindfleisch & Moorman, 2001; Suarez, 2005). The hypothesis of the relevant studies is that, for given users, the strong-ties part of networks may be decisive for technology adoption. The influence of these ties on the adoption of a new standard is much greater than the influence of a big network of only weak ties. The strength of ties is measured as a function of frequency of contact. In particular, strong-ties also comprise reciprocal obligations, intimacy, and emotional intensity (Granovetter, 1973). Kraatz points out that small networks with strong ties are valuable in “facilitating organizations’ attempts to adapt their core features in response to environmental change” (Kraatz, 1998: 623). Moreover, standard wars normally represent a period of turbulence. In these uncertain environments with uncertain information, the value of strong-tie network effects is greater than classical (weak) network effects (Hansen, 1999; Suarez, 2005). In short, even in the typical rational account like the industrial economic perspective, they realise that in standard wars the

influence of a small group of friends may be greater than a large group of people with weak ties.

2.4.5. The Perspective of Strategy

Also this perspective can present either a rational or a social account. A strategy is defined as a pattern in a sequence of actions, which is usually deliberately produced, and undertaken by firms in order to attain a corporate goal. In both rational and social accounts' view, technology sponsors engage in a series of strategic actions in order to promote their particular technology in standard wars. For example, in the rational account, this approach can be used to underpin the marketing strategies for demonstrating a technology's effectiveness (e.g. Meyer, Tertzakian & Utterback, 1997). In the social account, it can underpin the rhetorical strategies for persuading the audience's interpretations and behavior towards a specific technology (Munir & Philips, 2005).

In the marketing stream, this approach clearly demonstrates a technology's effectiveness. It suggests that the better a technology performs in relation to its competitors, the greater the likelihood that it will become dominant. Obviously, in this context the strategy is based on the rational account. In contrast, based on the social account, it may become a marketing strategy for influencing the perceptions of a range of actors regarding a new technology (Lampel, 2001). In David's (1986) study, the sponsor of QWERTY keyboard used speed-typing contests to draw attention to the keyboard design. The goal is to shape the technological frames of constituents regarding the new technology. Consequently, some empirical studies have found that

technological superiority does not always play a significant role in standard wars (Rosenbloom & Cusumano, 1987).

Collaboration has been seen as another critical factor in this perspective (e.g., Hargrave & Van de Ven, 2006). Collaboration is defined here as “cooperative, inter-organizational relationships which rely on neither market nor hierarchical mechanisms of control to ensure cooperation and coordination and, instead, are negotiated in ongoing, communicative processes” (Heide, 1994; Lawrence et al., 2002; Milne, Iyer & Gooding-Williams, 1996; Phillips, Lawrence, & Hardy, 2000, 2004; Powell, 1990; and cited Lotia & Hardy, 2008: 366). There are two main goals of collaboration in standard wars. Firstly, a collaboration should coordinate the differences among participants in order to produce innovative and synergistic solutions and to balance divergent stakeholder concerns (Hardy, Lawrence & Grant, 2005). Establishing collaborations can help focal firms to gain and guarantee supports from stakeholders for their new technology in a standard war (Cusumano, Mylonadis, & Rosenbloom, 1992; Garud et al., 2002; Khazam & Mowery, 1994; Ozcan & Eisenhardt, 2009). The logic of this approach is to increase the number of member organizations, so that the focal firms can gain as much support and resources as possible. In this vein, it can represent the rational account.

Secondly, motivating other organizations in relevant industries to collaborate can make symbiotic relationships. A symbiotic relationship rests on the notion that both founder firms and participants are likely to continue the relationship for as long as both continue to benefit (Etzioni, 1964; Tsui, Pearce, Porter, & Tripoli, 1997). Having symbiotic relationships in collaborations helps focal firms to maintain the momentum of their

R&D activities in these collaborations. Moreover, selecting and having more reputational partners in the collaboration can enhance the focal firms' social status (Hitt, Dacin, Levitas, Arregle, & Borza, 2000) and social justification and obligation (Zukin & DiMaggio, 1990). In this vein, using the strategy of collaboration in standard wars can be seen as representing the social account. The aim is to make markets believe that the new technology is trustworthy and appropriate.

Section 2.4.5 outlines a new interpretation of the perspective on standard wars. Each perspective includes the meanings of rational and social accounts at the same time. It depends on how you study the field. The difference between the two approaches does not simply claim that the rational account uses quantitative method while the social account uses qualitative approach. Rather, it depends on how you define and frame your study.

2.4.6. The Application of Social Account in Standard Wars Studies

Based on the foregoing sections, in the body of standard wars studies, the scholars have paid less attention to the social account while the rational account has dominated the relevant studies during several decades. The aim of this section is to apply the discussion of the social account to standard wars studies.

Organizations do not constitute closed systems. Rather, an organization is an open system, which is embedded in a field. In the stakeholder perspective, organizations are embedded in a nexuses of relationships with other organizations in an organizational field. All stakeholders, both critical and general, have their own interests and

expectations towards the new standards. In organizational institutionalism, organizations have to respond to multiple expectations (Oliver, 1991; Pache & Santos, 2010) because they are embedded in organizational fields. Their stakeholders can become the sources of various expectations. Recently, institutionalist scholars name these expectations as institutional logics (Thornton & Ocasio, 2008) and multiple logics as institutional complexity (Greenwood; Raynard, Kodeih, Micelotta, & Lounsbury, 2011). In order to conclude about the importance of the social accounts in understanding standard wars, the following section will refer to relevant concepts of organizational institutionalism. However, the detailed discussions relating to organizational institutionalism and institutional entrepreneurship will be discussed in Chapters 3 and 4.

In current studies of institutional complexity and logics, there is an increased focus on the interaction between institutional pressures and organizational responses (e.g., Oliver, 1991; Pache & Santos, 2010) and on cognitive viewpoints (e.g., Thornton & Ocasio, 2008; Phillips & Malhotra, 2008). Institutionalists define situations with multiple institutional logics, as characterized by ‘institutional complexity’ (Greenwood et al, 2011), referring to the number of logics and the degree of incompatibility between them. Organizations face institutional complexity when they confront incompatible prescriptions from multiple institutional logics (Greenwood et al., 2011). Institutional logics is defined as overarching sets of principles that prescribe “how to interpret organizational reality, what constitutes appropriate behavior, and how to succeed” (Thornton, 2004: 70). Institutional logics provide guidelines on how to interpret and function in social situation. Because logics can be seen as bundled sets of higher rules, norms, values and meanings framing how social actors make sense of the

world around them (Cloutier & Langley, 2013). These logics help to frame collective action as well.

Institutional logics are enacted by representatives having influence on the social actors in the field. These representatives can be seen as the organizations' stakeholders. For instance, in Greenwood and his colleagues' study, regional logics are 'particularly potent when the activities of firms, especially of large firms, are concentrated in regions whose governments champion regional distinctiveness and where the regional activities of the firm are significant' (Greenwood et al., 2010: 521). These regional logics are represented by local councils and the firms' actions are influenced by the councils. In a way, the councils can be seen as the stakeholders of the firms embedded in the field. In order to gain legitimacy from the stakeholders by fulfilling the appropriate requirements ruled by the institutional logics, the organizations have to respond the stakeholders' expectations in the field. However, there are many different stakeholders holding different institutional logics in a field, and different institutional logics may have competitive relationship with each other (Goodrick & Reay, 2011). They may make it important for organizations to satisfy different, even controversial interests at the same time. For instance, in the BD-HD DVD standard war, Hollywood studios and customers possessed different logics. The former stakeholders asked institutional entrepreneurs to pay attention to copyright protection while the latter requested opening of the protection mechanism. For Sony and Toshiba, it was a major challenge to respond to these controversial requirements. Consequently, how to respond to these different institutional logics is one of the main questions in institutional theory.

Further, the maturity and stability of institutional complexity may vary in different fields. Greenwood et al (2011) argue that mature fields are more settled and stable than emergent fields. The critical difference between mature and emerging field is the regularized inter-organizational relationships, which are identifiable patterns of interaction among organizations in the field (Greenwood et al., 2011). In a mature field, institutional complexity at the organizational level will be lower because the inter-organizational relationships are more settled. They have certain degrees of maturity and stability for institutional complexity. Thus, in mature fields organizations are better able to 'predict the demands from institutions. Hence, organizations should be better able to strategically respond with appropriate practices. For instance, before the BD-HD DVD standard war, the optical storage device industry had at least two standard wars, VHS vs. Betamax and SD vs. MMCD. These standard wars provided valuable experience concerning the importance of capacity and network effects but also of the role of stakeholders (in particular, content providers). Moreover, in the digital era, these content providers pay much attention to copyright protection technology. In turn, the protection can be viewed as the dominant institutional logic in the field. In other words, the predictability as an effect of established institutional logics can be expected to enable institutional entrepreneurs to learn how to respond and mitigate the challenges of institutional complexity. This study shows that by responding to the demand from a dominant institutional logic (copyright protection) in a mature field in an appropriate way (providing safer technology), institutional entrepreneurs can obtain rewards (the victory of standard war).

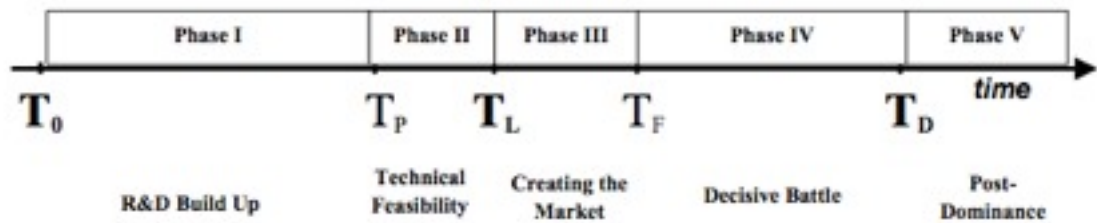
Consequently, studying standard wars, we cannot ignore the influence of other organizations which are embedded in the same field and cannot ignore the established

technology trajectory either. Moreover, although the settled things make the field mature and more easily predictable, it also knit a complex web for the focal firms who want to alter these settled things. In a way, we can say that the focal firms need deliberate plans for changing the settings.

Suarez (2004) proposed an integrative framework to explain the process of standardization, producing this framework by integrating the literature of industrial economics, technology management, and institutional theory. Certainly, this framework can be used to explain how to win standard wars. The framework suggests that the outcome of standard wars is influenced by firm-level and environmental factors. The firm-level factors that may influence technological dominance include the firm's technological superiority, complementary assets and credibility, installed base, and strategic manoeuvring. Environmental factors which influence dominance and intervene in relations between firm factors and dominance include institutional regulations, network effects, environmental regimes and characteristics of the field itself. Suarez clearly demonstrates the importance of strategic manoeuvring in standard wars. In order to gain the support of other organizations, focal firms have to make them understand the meanings of new technological artifacts (Bartel & Garud, 2009). However, he fails to identify the importance of the construction of meaning.

Suarez's (2004) model is a simple linear model discussing five phases in the process of technological dominance. In a temporal order, R&D buildup, technical feasibility, creating the market, decisive battle, and post-dominance are identified as the five critical phases in standard wars.

Figure 2.1. Suarez's Simple Linear Model of Technological Dominance



Source: Suarez (2004)

In the model, each phase is characterized by the main tasks to be completed. The model implies that when the main tasks of each phase are completed then the focal firms can go further to the next one.

Table 2.1. Key Factors of Success at Each Stage of the Dominance Process in Suarez's Model

Factor Type	Dominance Factor	Phase I	Phase II	Phase III	Phase IV	Phase V
Firm-level	Technological superiority		***			
	Credibility/complementary Assets	***			***	
	Installed base				***	***
	Strategic manoeuvring			***		
Environmental level	Regulation		***			
	Network effects and switching costs				***	***
	Regime of Appropriability	***				
	Characteristics of the technological field	***				

Source: Suarez (2004)

Actually, Suarez's (2004) further proposes a typology and points out that what kind of tasks should be completed in each phase (Table 2.1.). For example, in phase I, focal

firms should build up the firm's credibility, establish the complementary assets of new standards and determine the regime of appropriability and the characteristics of the technological field, which determine the level of the competition and collaboration that will exist among different technological trajectories. Based on the outcomes of the phase I, the firms can further build up the technological superiority and the regulative attributes of new standards in phase II and likewise.

This study suggests that the phases of standard war cannot be distinguished clearly. The critical events can trigger a new phase of the standard war but this does not mean the previous phase is ended. Focal firms and partners' tasks are becoming more and more complex along with time development. The importance of the various factors shifts over time according to the sequence of Suarez's model but many tasks happen simultaneously.

The focal firm needs a deliberate plan. During this process, they need to theorize, engage in R&D, develop the specifications of new standards, establish plans for promoting them and initiate any other necessary activities. The focal firm selects a number of stakeholders when the plans are put into action. It is unlikely that there will be stakeholders who are suitable for every task. Rather, the focal firm therefore needs to select different types of stakeholders at the beginning of the process and invite them to form collaborations. Some will focus on R&D activities while others will concentrate on marketing campaigns. Even though some stakeholders are not critical in the beginning stages, by selecting them to engage in the collaborations, focal firms can utilize them as symbol. Their inclusion may not be functionally relevant but it is symbolically important because it shows that the new standard is endorsed by these

stakeholders. Later, when the new technologies are presented to the market, focal firms tend to cooperate intensively with stakeholders with complementary products. Their main task at this stage is to promote the final products in the market as quickly as possible. In this vein, this study stresses that the profile and the criticality of stakeholders are dynamic in standard wars. Before discussing the issues, we need to clarify the difference between critical and general stakeholders.

2.4.6.1. The Profile and Criticality of Stakeholders in Standard Wars

Rather than adopting broad definitions of the term ‘stakeholder’ (e.g. Mitchell et al., 1997; Frooman, 1999), I adopt a strict perspective concerning its use in standard wars, which I term ‘critical stakeholders’. ‘Critical stakeholders’ refers to reputational actors who have critical resources for the organization’s R&D activities, manufacturing and marketing as part of processes of technological standard change. The participation of such stakeholders directly contributes to the new standards of focal firms, in both functional and symbolic terms. Their participation not only influence the network effects and product performance of technological standards, but also motivates other organizations to engage in a particular collaboration. In accordance with this definition, many stakeholders, such as governments, are excluded from this study. In a nation-state setting, government policies should be seen as a basis for organizations. Although government policies influence the actions of focal firms in specific ways, initiating standard wars means that focal firms are able to compete equally with their rivals for the dominant position in a market. If Firm A receives an exclusive favor from the government, however, Firm B will not be able to compete equally with it. As a result, this situation cannot be defined as a standard ‘war’.

Focal firms should view such critical stakeholders as symbiotic partners. In comparison with other general stakeholders, who have fewer critical resources, both functional and symbolic, critical stakeholders possess the critical resources required by focal firms in standard wars. Standard wars can seldom be implemented without support, so firms must typically mobilise collaborations, and cultivate cooperation with stakeholders (Fligstein, 1997; Greenwood et al., 2002; Fligstein, 2001; Lawrence et al., 2002; Rao, 1998). In collaborations, focal firms must define the responsibilities and obligations of members. These responsibilities and obligations are capable of putting them in the right position to seek divergent change (Scully & Creed, 2005). Focal firms are generally likely to invite stakeholders in relevant industries to engage in collaborations. If such invitations are accepted, focal firms are able not only to secure information, and to exchange and share resources (Nahapiet & Ghoshal, 1998), but also to turn these stakeholders into symbiotic players, thus reinforcing their influence on standard wars. In order to maintain the quality of their relationships with these critical stakeholders, focal firms must deal with them using reciprocity.

By using reciprocity, focal firms will acquire the ability to prevent, or decrease the likelihood of, resistance and misunderstanding. If such situations occur, focal firms must devote greater effort to repairing the relationships with their stakeholders. The literature of networks therefore suggests that they are willing to choose critical stakeholders with whom they have strong, long-standing ties (Burt, 1992; Gulati, 1995, 1998; Rosenkopf, Anca & Varghess, 2001). This is because nurturing symbiotic relationships with organizations which have weak ties with the focal firms is risky and consumes both time and money. Instead, focal firms are more likely to choose critical

stakeholders who have or have had intensive relationships with them in promotional, R&D, manufacturing and marketing activities, and, as a result, have strong ties with them. They have much greater communication frequency, mutual trust, emotional intensity and reciprocal service (Granovetter, 1985). Focal firms are more likely to establish groups in standard wars with these critical stakeholders than with other stakeholders, in order to make essential decisions.

This does not mean that other, more general, stakeholders are not important. General stakeholders are not able to directly influence the theorisation and specification of new standards. However, they can support those materials which are co-developed by focal firms and critical stakeholders. General stakeholders have less reputation and credibility in a given institutional setting. However, the amount of support provided by general stakeholders will also motivate the actions audience toward the focal firm's camp (where the audience includes prospective consumers and organizations who have or have not engaged in the camps of competitors). As a result, focal firms should establish different strategies for critical stakeholders and the general member organizations with which they collaborate in standard wars (Hardy et al., 2005). Focal firms should have specialised strategies for critical stakeholders, which respond to the expectations and requirements of such stakeholders, and thus motivate them to engage in their groups. Thus, focal firms and their critical stakeholders can rapidly research and develop the specifications of a new technology, or perform other activities which are critical to standard wars. Focal firms should have more generalised strategies for other member organizations, in order to further broaden and permeate the influence of critical stakeholder groups, and to establish more technical specifications for their new technologies. In turn, focal firms are able to produce efficient specifications for new

technologies and to broaden the economic scale of new technologies in a particular area. In short, having a mixture of strong and weak ties in a collaboration can increase the collective performance of that collaboration (Hardy et al., 2005).

Having the support of critical stakeholders generally has two advantages for firms engaged in standard wars. Firstly, if critical stakeholders are motivated to engage in groups established by focal firms, they will legitimize new technologies and bring their own connections with other organizations into these groups. In strategic management, Choi and Wang (2009) suggest that having good relationships with critical stakeholders not only enables a focal firm to perform more strongly in terms of new technology, but also helps poorly performing firms to quickly improve. When critical stakeholders have a good reputation, focal firms gain the appearance of legitimacy by being allied with them (Vaara, Tienari & Laurila, 2006). If critical stakeholders are symbiotic allies in standard wars, they are more likely to share information and give support in ways that produce greater efficiency and innovation (Harrison et al., 2010). In this way, networking with critical stakeholders, together with strong performance, make them more attractive to prospective organizations and to customers in a particular marketplace (Fischer & Reuber, 2007; Fombrun, 2001; Puncheva, 2008).

Secondly, if focal firms have critical stakeholders, they can rapidly promote new technologies and achieve penetration into markets. Marketing theory tends to view the external environment as an uncontrollable constraint (Polonsky et al., 1999). However, according to the stakeholder perspective, a focal firm and its environment are extremely interdependent. Many elements of the external environment are influenced by the firm. They further suggest that focal firms should use stakeholders to integrate a wider set of

relationships into a model of marketing interactions, resulting in more options for the firm and thus more opportunities to create value.

This study suggests that the criticality of stakeholders could be dynamic. Focal firms have to achieve different tasks in different stages of standard wars. However, no one individual organization can achieve all of them. Some of stakeholders may be more capable of achieving some tasks and others may efficiently achieve others. Focal firms should select qualified partners to achieve specific tasks. They should keep an arms-length relationship with stakeholders. Then they can recognize who have sufficient capabilities to play the critical role on some tasks. In a sense, the term ‘critical stakeholder’ does not point out that specific organizations have close relationship with the focal firms. Rather, the term means that if the organization has sufficient capability to complete specific tasks in standard wars, the organization can be called as critical stakeholder for the focal firm. Thus, not only the criticality of stakeholder but also the profile of critical stakeholders is dynamic in standard wars. They are task-oriented.

2.5. Attributes of Standard Wars

Integrating rational and social accounts, this study identifies four attributes of standard wars: framing, collaboration, network effects, and product performance. The social construction perspective claims that the focal firms can use discursive activities to frame new technologies to their audience during standard wars. The body of literature on the industrial economic perspective pays attention to network effects and product performance in standard wars. The strategy and stakeholder perspectives demonstrate that focal firms should develop skills which enable them to establish collaborations and

influence critical stakeholders, enhance the quality of new technologies and promote new technologies to the public. The institutional theory perspective provides a different view. The new standard can be seen as a kind of institution when it has been successfully standardized in markets. The SI approach suggests that many social, economic, political, organizational and technical factors can influence standard wars. This approach underlies the perspectives used in the study of standard wars, and this section will define and elaborate the role of these attributes in standard wars.

2.5.1. Framing

The aim of framing is to create a vision for standard wars. Focal firms must craft a vision for change, focusing on the misalignment of current standards. In order to ensure that the interests of social actors are satisfied, focal firms should create strategies to enable the new standards to be altered or the misalignment to be changed.

Using social movement studies, firms often utilize framing strategies to present the promoted standard as a solution to the needs of the public and those of prospective organizational purchasers. Communication studies (e.g., McCombs & Shaw, 1972) show that the framing discourses of focal firms should present their understanding of the views of the audience. Thus, focal firms should set up and maneuver agendas which appear on various media, including mass media. Scholars distinguish three dimensions to this agenda-setting process: (1) the problem it helps to resolve; (2) the existing arrangements to which it is preferred; and (3) the compelling reasons which motivate it (Snow & Benford, 1988). Social movement studies further show that these dimensions are translated into three different types of functional framing: diagnostic framing,

prognostic framing, and motivational framing (Battilana, Leca, & Boxenbaum, 2009; Markowitz, 2007; Misangyi, Weaver, & Elms, 2008).

Firstly, diagnostic framing seeks to explicitly make known the problems with current standards and assign blame for them (Suddaby & Greenwood, 2005). Some studies call these problems contradictions (e.g. Seo & Creed, 2002) or discontinuity (e.g. Anderson & Tushman, 1990; Tushman & Anderson, 1986). The diagnostic framing strategy informs the audience clearly that existing standards contradict the interests and expectations of social actors.

Secondly, prognostic framing presents the promoted new standards as being superior to the misaligned standard and/or those alternatives which are supported by competitors (Suddaby & Greenwood, 2005). This strategy also presents the new standards as having won some attention or support from critical stakeholders. This strategy implies that the theorisation and/or specifications of new standards resonate with the interests and values of prospective organizational purchasers, and show awareness of their requirements (Fligstein, 2001).

Thirdly, motivational framing provides compelling reasons to support the new standard being promoted (Misangyi et al., 2008). Focal firms should be capable of clearly recognizing and identifying the interests of prospective organizational purchasers (Fligstein, 1997) and responding to their requirements. In order to successfully motivate others to collaborate, they should possess the skills to identify their essential audience, together with the ability to analyze and secure cooperation in collaborative entities and

to assess the network configuration of the positions of partners and of other relevant actors in the given field.

These different types of framing highlight the role of discursive activities in standard wars. Discursive activities help focal firms to promote their ideas and to persuade different actors in the field or in the competitor's camp. Zott and Huy's (2007) study, a two-year field study of British ventures, shows that firms initiating new ventures are more likely to acquire resources and support if they perform discursive actions. In their study, discursive activities are defined as "the actor display[ing] or tr[ying] to draw other people's attention to the meaning of an object or action that goes beyond the object or action's intrinsic content or functional use" (Zott & Huy, 2007: 70). They show that conveying the firm's credibility, professional organization, organizational achievement and quality of stakeholder relationships can help it to obtain more resources and achieve a lower level of information asymmetry than is the case among firms who do not do this.

The framing strategy also outlines the role of collaboration in standard wars. A successful framing strategy can divert the audience's attentions to the misalignment of the existing standard. It can also motivate them to find solutions collaboratively. In summary, if focal firms have a good reputation and/or are partners in collaborations, they may be able to motivate other prospective organizations to engage in their projects (Stuart, 2000).

2.5.2. Mobilizing Collaboration

Firms typically need to mobilize collaboration and cultivate cooperation by investing in relevant activities in standardisation processes (Fligstein, 1997; Greenwood et al., 2002; Fligstein, 2001; Lawrence et al., 2002; Rao, 1998). In order to manage the actions of participants, appropriately, focal firms should be capable of defining and assigning their responsibilities and obligations in standard wars (Scully & Creed, 2005).

Implementing standard wars is both costly and challenging. The main goals of collaborations are to mobilize resources, exchange and share ideas, coordinate the different opinions of members, and establish mechanisms to govern the management of the tangible and intangible resources in standard wars (Battilana et al., 2009). Tangible resources, like financial assets, can be used to counter the liability of focal firms in the early period of standard wars. The meanings and usages of new standards can easily be ignored, because the public is not familiar with them (Greenwood & Suddaby, 2006; Garud et al., 2002). By using financial resources, focal firms can encourage some of their critical stakeholders to favor the promoted new standards (Demil & Bensédrine, 2005)

Intangible resources are concerned, social positioning can help firms to mobilize collaborations, which again supports the implementation of standard wars. Sherer and Lee (2002) suggest that high status firms can leverage their network status, in order to impose changes in a particular field of activity. The focal firm can also leverage the endorsement of such higher status firms in order to increase the legitimacy of new

technologies (Deephouse & Suchman, 2008) and then mobilize other actors to take part in the achievement of change.

This discussion demonstrates the importance of networks in standard wars. Both Lin (2001) and Nahapiet and Ghoshal (1998) indicate that social resources embedded in social connections play important roles in the interaction between social structures and individual actors. Firms are able to access and use social resources to maintain or promote their interests in a social structure. A collaboration can be seen as a community which is subject to similar regulatory pressures (DiMaggio & Powell, 1983; Scott, Ruef, Mendel, & Caronna, 2000). When reputable and high-status firms (including focal firms and stakeholders) collaborate, they do not only jointly own many resources but they create a powerful atmosphere. This can construct equally powerful meanings which influence the perceptions and actions of prospective organizations. In turn, as other organizations cannot easily ignore the promoted new standards, focal firms can make them think again about the possibility of collaborating (Owen-Smith & Powell, 2008).

Furthermore, focal firms are more likely to choose partners who have joined them in intensive activities, such as R&D, or who engage in such intensive activities themselves. These activities create strong ties, which can facilitate in-depth, two-way communication and the exchange of detailed information between or among related parties (Granovetter, 1985; Krackhardt, 1992; Uzzi, 1996). In addition, when firms are considering standard wars, they may need richer and more detailed information about the implications and practices of new standards. If they already have strong collaborative ties, focal firms can ensure that social resources are exchanged and shared between these member organizations. Focal firms can easily define these participants as

symbiotic players associated with the enactment of standard wars (Lepak & Snell, 1999). This symbiotic relationship enables both partners to mutually adapt to the changing demands of the new standards. In this way, choosing organizations who already have strong ties as symbiotic partners in standard wars is an effective strategy.

Consequently, aside from the membership structure of collaborations, I would suggest that focal firms should know how to make use of their symbiotic partners in standard wars. This view recalls the role of the critical stakeholder. Although every participant has, to some extent, a stake in the needs of focal firms, critical stakeholders can most easily become symbiotic partners. This is because symbiotic partners have an intensive relationship with focal firms. Once a participant has an intensive relationship with, and a critical stake in, the focal firm, the focal firm can be certain of winning its engagement.

2.5.3. Network effects

Network effects occur when the value of a product or service to a consumer is contingent on the number of people using it. Examples of this include telephone networks, fax machines, railway networks, game consoles, etc (Farrell & Saloner, 1985; Katz & Shapiro, 1986, 1994).

Poor availability of complementary products increases the likelihood of technological lock-out for their firm that sponsors the technology. Gupta, Jain, and Sawhney (1999) determine that the actions of the manufacturers of complementary products play a critical role in the consumer adoption process. They also suggest that the suppliers of

television programming have a significant impact on the installed base growth and diffusion of the standard of high-definition television. In this way, producers who are also stakeholders may hold substantial influence over consumer expectations concerning the core product, even after dominant standards have emerged (Clements & Ohashi, 2005).

The scale of network effects may be influenced by the performance of both frames and collaborations. This is because they can influence development specifications and increase the legitimacy of new technologies. The former may strengthen product quality, product price and so on, while the latter can influence a greater number of prospective organizations to take notice of the development of a promoted new standard and take action. This study suggests that an effective frame and effective collaborations may in turn lead to network effects in standard wars.

2.5.4. Product Performance

The aim of product performance is to increase market share, achieve economies of scale by selling a new product which holds the new technological standard, and respond to the expectations of stakeholders. Product performance has been seen as a determining factor in studies of competitive advantage (e.g. Barney, 1991; Montoya-Weiss & Calantone, 1994; Henard & Szymanski, 2001), as well as being a factor which is evaluated by both the market and stakeholders. In short, product performance should demonstrate the specifications of new standards which have been successfully integrated with the views of collaborating stakeholders.

Even if products display superior performance and have the support of stakeholders, some empirical studies show that they may still not be accepted by the market. This is because the products of one or more competitors have established a large installed base with the earliest versions of those products (David, 1985; Cusumano et al., 1992). A focal firm which owns a product which gains the endorsement of stakeholders and a large installed base before it is unveiled, should clearly maintain the leading position in that standard war. However, if the focal firm contradicts the stakeholders' expectations, even though the product has been presented to the market, the stakeholder will move away or realign themselves with the focal firm's competitors. For example, Sony's Blu-ray Disc (BD) and Toshiba's HD DVD standard used the same copyright protection mechanism (Advanced Access Content System, AACS) to protect the intellectual property rights of content providers. However, in 2005, Toshiba invited Microsoft to join them on the side of HD DVD, and announced that they would allow consumers to copy HD DVD content on to their own home network. This announcement strongly contradicted the interests of content providers. Later, in 2007, Sony announced that the BD standard would provide more protection, a development they called BD-Plus. In other words, the BD standard provides greater security for one highly critical stakeholder, the Hollywood studios. As a result, even though Toshiba had the leading position in the DVD standard and had the support of Microsoft, many Hollywood studios changed their mind and exclusively supported the BD standard.

Effective product performance is led by collaboration in standard wars. During the specification development process, the focal firm will use a framing strategy to make use of pre-launch promotion, and ensure that the audience is aware of new developments. Product performance during standard wars is strongly influenced by

R&D activities in which stakeholders participate. Such path dependence manifests itself in positive feedback or opportunities for leading firms to further consolidate their leading position (Arthur, 1996). In other words, there is a propensity for the strong to grow stronger and the weak to grow weaker (Shapiro & Varian, 1999). If the leading firm becomes unable to retain the support of its stakeholders, it may also rapidly lose its leading position. In this way, the leading firm has to not only keep promoting the development of the new standard to the market, but also keep the expectations of stakeholders in mind, and make those expectations material in the specifications of the new product.

2.5.5. Discussion of these Attributes in Existing Studies

In fact, framing, collaboration, network effects, and product performance are all explicitly or implicitly mentioned or discussed in existing studies. Most studies of technological standard change have paid a great deal of attention to the issues of collaboration, network effects and product performance (e.g. Clement & Ohashi, 2005; Besen & Farrell, 1994; Farrell & Saloner, 1985, 1986; Katz & Shapiro, 1986, 1994; Krugman, 1991; Hovav, Hemmert & Kim, 2011; Cusumano et al., 1992). Scholars cluster these concepts together to produce functionalist arguments. The literature concerning social movements also examined the role of frames (e.g. Battilana et al., 2009; Van de Ven & Hargrave, 2004), which has received less attention in functionalist arguments. This section will discuss the attributes of standard wars as they appear in actual standard wars and elsewhere. A review of actual standard wars and their attributes can also be used to demonstrate the importance of these attributes, and this

discussion can also be used to further highlight the research gaps identified by this study.

Framing strategy is mainly discussed in the literature of social movements (Battilana et al., 2009; Van de Ven & Hargrave, 2004). When focal firms identify opportunities in institutional settings, they frame interpretations, social constructions and attributions within processes of change. Framing then plays a mediating role between these opportunities and collective actions. For example, Garud et al. (2002) implicitly mention the role of framing in their study of the Java case. They determined that Sun sponsored Java technology in an open-system strategy. Sun framed open-system strategies to allow software developers and manufacturers of complementary products to easily access Java technology. In this example of technology sponsorship, Garud et al. paid attention to the role of framing. By using framing in the media, Sun was able to attract the attention of its audience and to change their perceptions of its new standard. For example, Sun announced that 'write-once, run-anywhere' was its promotional slogan for the technology.

The case also showed that Sun understood that software developers were their most important audience. Based on the sub-research question proposed in this study, these software developers could be seen as Sun's stakeholders. Garud et al. detailed the process of interaction between Sun and these stakeholders. The company allowed third-party developers to download Java from its official website free of charge. It also trained these software developers in using Java to develop Java-based software. As a result, Sun defeated Microsoft in the area of technology sponsorship.

However, the Java case fails to explain the ways in which focal firms use a larger number of discursive activities to maintain their changing discourses in the minds of their audiences, and then to further influence their actions so that they support the new standard. It also fails to explicitly discuss the ways in which focal firms use collective actions to encourage their most important stakeholders to share their commitment and alignment of interests, and to coordinate their actions in standard wars (Gulati, Wohlgezogen & Zhelyazkov, 2012). Firstly, the one of major tasks of framing is to establish and sustain agendas in the mind of the audience. For this reason, focal firms not only frame visions of their new standards in the mind of the audience, but must also use sequential discursive activities to promote standards, undermine the alternative standards of competitors, and discuss the advantages of their standards. Generally speaking, these agendas aim to retain and sustain the influence of discourses on the audience. Some empirical studies simply mention the role of framing, as in the Java case. Other empirical studies, such as those by Zilber (2007, 2006, 2002), have examined the ways in which two contradictory narratives compete for the dominant position in their social settings. However, they fail to identify which actions are used by focal firms or actors in standard wars. This study aims to fill this research gap, something which will be one of the major research contributions of this study.

Secondly, to initiate standard wars, focal firms must share and coordinate the commitments, visions, and common actions of many other partners. To some extent, this viewpoint overlaps with the argument for collective action in standard wars. This is because, as social movement studies demonstrate, framing aims to motivate the audience to act favorably towards the concept of the focal firm. If they have more participants in their camps, focal firms have traditionally found it easier to achieve their

goals in standard wars. However, simply collaborating with partners does not guarantee that the theorisation of a technological standard is successfully achieved. Without considering the roles and influence of different stakeholders, focal firms find it difficult to finalize the specifications of standards and to achieve their final goals. For this reason, focal firms would be better employed managing critical stakeholders to theorize their specifications. They should keep certain intensive relationships with focal firms. Their role in standard wars is different from that of other general stakeholders and from the traditional definition of stakeholders. The viewpoint and contribution of critical stakeholders will be further discussed later.

In contrast to their treatment of framing, the existing studies discuss the other three attributes more explicitly. These attributes can be generally clustered as functionalist arguments. They argue that the use of collective action in standard wars leads to the generation of wider network effects and better product performance. They in turn aim to improve the efficiency of a new standard and then an increase in revenue. This section will discuss the network effects and product performance of actual standard wars, and then discuss the role of collective actions and how they relate to the outcomes of those standard wars.

Proponents of network effects, for example, Clements and Ohashi (2005) suggest that many products exhibit network effects, in which the value of a product to its customers increases with the total number its of users. In their study of the U.S. video game market, they show that expanding the variety of complementary products (in this case gaming software) makes the original product more effective. According to Besen and Farrell (1994), network effects can be seen as being a demand-side economy of scale.

Therefore, since the purchasing decisions of buyers are strongly influenced by forecasts of future sales, “there can be large rewards to affecting these expectations” (118). In their view, therefore, an inferior product “may be able to defeat a superior one if it is widely expected to do so” (118). (See also Farrell & Saloner, 1985, 1986; Katz & Shapiro, 1986, 1994; Krugman, 1991).

Generating network effects can be associated not only with economic factors but also with social characteristics. Hovav, Hemmert and Kim (2011) suggested that network effects created by South Korean government support for IPv6 (Internet Protocol version 6) acted as an adoption driver, which combined with social characteristics to promote the technology. Their study found that the South Korean government’s IPv6 strategy focused on extensive investments in the development of related technology in order to demonstrate the technical capabilities of IPv6 and create network effects. Their study also showed that socio-political dynamics created by the South Korean government’s support for IPv6 also acted as an adoption driver. Their study suggested that normative pressure has a salient influence on adoption decisions. In this case, this was because South Korea is a collectivistic and high power-distance society, so that leading organizations in Korean society tend to exert strong influence over the behaviour of other organizations (Biggart, 1997). Government policies and the influence of leading organizations in South Korea created the expectation that IPv6 would become a dominant design in that country. The social characteristics of Korea meant that normative pressure and network effects were the main adoption drivers of IPv6. As a result, their study indicated that socio-political factors should be considered when studying standard wars.

Product performance is also seen from a functionalist viewpoint in the existing empirical studies. In general, such scholars have argued that the adoption of standards is positively associated with higher levels of operational performance. According to marketing and stakeholder perspectives, product performance is a very important factor when securing customer satisfaction and loyalty. For example, the case of Betamax vs. VHS (Video Home System) highlights the importance of this aspect of product performance (Cusumano et al., 1992). Their study shows that the key differences between Betamax and VHS in terms of technical performance were tape length and image quality. Betamax offered sharper recording as well as clearer sound and image, but could only hold an hour of content, as opposed to the two hours of VHS. Although clearer image and sound also satisfied the requirements of Hollywood studios, larger capacity lowered the costs of these content providers, as well as saving space for the retailer. Moreover, between 1977 and 1983, Sony was the first company to offer multi-function machines (including scan, slow and still functions), and high fidelity (hi-fi) sound. JVC were generally able to match Sony's new features within a few months, and occasionally more quickly. Their study shows that the extent of superiority is not defined only by customers, but also by stakeholders (in the case, Hollywood studios, retailers and so on). Although Sony was generally considered to have produced a superior product in this case, it still lost the standard war because it contradicted the interests of stakeholders.

Finally, the role of collaboration has also been examined closely in empirical studies of standard wars. For example, Garud et al.'s study (2002) of the Java case showed that Sun established its own collaborations in order to frame and define the specifications of Java, and to communicate them to the market. Hovav et al.'s study (2010) of the South

Korean IPv6 case showed that the South Korean government collaborated with leading organizations in order to shape normative pressure and generate network effects. Such normative pressure made other South Korean organizations believe in the advantages of the technology and adopt the IPv6 technology. Cusumano et al.'s study (1992) of the standard war between Betamax and VHS explicitly shows that the JVC's collaborations with other organizations was the critical factor in the victory of VHS. Furthermore, their study also demonstrate that a focal firm must collaborate with stakeholders. In a standard war, product performance needs to be evaluated and endorsed by such stakeholders, and then promoted to markets. As a consequence, these studies conclude that a collaboration should be seen as a core concept in a standard war. Its function to help the specifications of standards and activities to be theorized (using framing, network effects and product performance).

This finding shows that focal firms need to establish certain relationships with stakeholders who have a certain reputation in relevant industries. Hollywood studios not only provided their movie titles as complementary products but also used their reputations to attract consumers to purchase the VHS standard. For this reason, Hollywood studios were critical stakeholders in the case. This study also shows that before they generate network effects and product performance, focal firms need to collaborate with critical stakeholders who have reputations, relationships and common experience which are relevant to the standard. These features differentiate critical stakeholders from general stakeholders. Because of this, focal firms need to instigate collective actions with two groups of stakeholders. This study suggests that, at first, focal firms should ally themselves with critical stakeholders in order to theorize the specifications of new standards and to establish primary plans at the beginning of

standard wars. The outcome of this can be used primarily to legitimize the new standards and to motivate more organizations to participate in their camp. Later, focal firms should collaborate with all participants in their camps (including critical stakeholders) to discuss the plans being used in the standard wars. If they have well-established members in their camps, the specifications of new standards may be finalized as completely as possible. As a result, new standards, which have been theorized by critical stakeholders and produced by majority organizations, can generate wider network effects and better product performance than those standards which have been produced by lesser organizations.

This section has examined the four attributes of standard wars (framing, collaboration, network effects and product performance) in existing studies of actual standard wars. The role of framing has formed part of social movement studies, while the other three are discussed in empirical studies of standard wars. Discussing these attributes also highlights some previously unnoticed lacunae in existing studies. Firstly, these studies fail to show the ways in which focal firms use a range of discursive activities to maintain the audience's attention, and to change their actions in other ways in standard wars. Social movement studies show that focal firms must diagnose the problems of existing standards, and suggest potential solutions to the social actors who must deal with these problems. For this reason, focal firms need to keep their ideas in the mind of the audience. One of the main contributions of this study is to fill this gap in the existing research. It proposes new ways in which focal firms can use discursive activities to influence the perceptions of the audience in a standard war. Secondly, social movement studies also demonstrate that focal firms will be able to motivate the actions of the audience after they have successfully transmitted diagnostic and prognostic messages to

them in a standard war. According to functionalist arguments, establishing collaboration can lead to standards having network effects and higher product performance. However, this study further suggests that the establishment of collaborations in a standard war is a dynamic process. Focal firms need to use a number of critical stakeholders to theorize the specifications of a new standard and set up a primary plan before they do anything else. They can then invite other general stakeholders to discuss the specifications further, and then, if necessary, change this plan. In other words, they should use their well-established membership and a variety of practices to manage their critical and general stakeholders. This argument does not contradict the functionalist arguments proposed in this section, but shows that the profile of critical stakeholders may be dynamic as standard wars change over time. This is another main contribution of this study to research, as it discusses the ways in which focal firms manage critical stakeholders in standard wars.

2.6. Conclusion

In the digital era and times of economic recession like the present, the preferences of users and the magnitude of technological standards change quickly, due to the shorter life-cycles of products and the convergence of multiple technologies. Firms need to speed up both innovations and standardisation. Moreover, in a recession scenario like the present one, new standards must respond not only to the requirement of functionality but also to consumer sensitivity about price. Consequently, producing standards becomes a longer and harder process. Understanding the processes of standard wars can help us to know what strategies should be used and which attributes of standard wars need to be taken into account. Focal firms must not delay in making

markets and consumers believe that their new standards are better than those of their competitors.

This chapter has discussed the benefits and risks of initiating standard wars. It has also outlined five perspectives on standard wars: strategy, industrial economic, social construction, institutional theory and stakeholder. All of them contribute different viewpoints to the study of standard wars. The outcomes of network industries are influenced by increasing returns and positive feedback which lead to adoption. When network effects are high, a technology produced by a single firm may lock in the market. Conversely, the products of competitors may be locked out. Therefore, in standard wars, in particular network industries, the outcome will be a classic “winner-take-all” game. Thus, although firms may confront risks in the future, their considerable benefits still encourage firms to initiate standard wars.

The empirical studies made using these perspectives indicate different attributes of standard wars. This chapter has determined that framing, collaboration, network effects and product performance as the attributes of standard wars. We are keen to draw up a more useful theory that will lead to a better understanding of the processes of standard wars. Although this chapter has identified four attributes of standard wars, we still need a theoretical framework to explain the relevant exogenous and endogenous variables. This new framework would better integrate the different viewpoints discussed in the chapter and proposed by Suarez (2004), Murmann and Frenken (2006), and Kaplan and Tripsas (2008) model. In this way, this study proposes a proper theoretical framework to explain the processes: institutional entrepreneurship.

The institutional theory perspective gives a different viewpoint from the other four perspectives. It suggest that standard wars can be seen as processes of institutional change. This perspective also suggests that social actors are embedded in existing institutional environments. As they can reflect and have self-knowledge, they are able to recognize and perceive their own needs and opportunities, together with the appropriate course of actions which can collectively change existing standards (Benson, 1977; Seo & Creed, 2002). They are capable of reflecting, examining and acting in ways which run counter to those rules which are generally taken for granted (Giddens, 1984; Garud & Karnøe, 2003). When existing standards fail to meet the interests and needs of social actors, these standards will force these knowledge-holding agents to be institutional entrepreneurs.

In the institutional entrepreneurship perspective, social actors can be seen as purposeful actors. They deliberately create a new system which combines and recombines the functionalities of different knowledge sets. They define, legitimise, combat, and/or co-opt other organizations in order to achieve their goal of change (Scott, 1994). As a result, they devote much effort to motivating collective action and developing strategies to establish stable and secure interactions with other organizations to create new systems. These actors not only perform the role of traditional entrepreneurs in the Schumpeterian sense, by discovering opportunities, combining and/or recombining existing resources to produce new products or services; they also help to establish institutions through their processes or business activities (Li, Feng, & Jiang, 2006). In this way, I would suggest that institutional entrepreneurship in technological change has a similar logic to that of standard wars. In the next chapter, on institutional change, I

will focus on processes of institutional change and describe the similarities between institutions and standards.

Chapter 3. Institutional Change

3.1. Introduction

Rules, norms, and beliefs represent the three pillars (regulatory, normative and cultural-cognitive) which underlie institutions (Scott, 2008). The regulatory pillar is involved in the establishment of rules, and attempts to influence the behavior of social actors, through a knowledge of the rules to which they conform, and the, manipulation of sanctions to which they are subject. The normative pillar emphasises the normative rules which introduce prescriptive, evaluative and obligatory dimensions into institutional domains. When aligned with norms and values, it defines objective goals and indicates the appropriate way to proceed. The cultural-cognitive pillar denotes the shared conceptions which construct the nature of social reality through its meanings. Using discourses, the information perceived by an audience can become objective in its mind. The given discourses must be aligned with larger belief systems and associated with the experience of the audience in a particular field (Powell & DiMaggio, 1991). If this does not happen, new standards and institutions are easily ignored or resisted.

Standards represent rules of engagement that dictate the ways in which different components of technological systems work together to provide utility to users (Garud & Kumaraswamy, 1993). If producers do not comply with these specifications, they may be not allowed to develop relevant products of the necessary quality. In this way, technological standards also have regulative attributes. New technological standards can also be diffused through professionalization and then become either norms or taken for

granted. In this way, standard wars can be seen as processes of institutional change (Garud, et al., 2002).

Scholars categorize institutional research into organizational field as organizational institutionalism (Boxenbaum & Rouleau, 2011), which includes isomorphism, and studies of institutional change (e.g. Castel & Friedberg, 2010; Battilana et al., 2009; George, Chattopadhyay, Sitkin, & Barden, 2006; Greenwood, et al., 2002; Seo & Creed, 2002). It is a branch of institutional theory which has proliferated within organizational theory (Greenwood, Oliver, Sahlin, & Suddaby, 2008). The studies of institutional change suggest that institutions are not only constituted by the three pillars, but also established by the sequential actions of social actors. Institutions can also be changed by the deliberate actions of social actors. Studies of institutional change arrive at a variety of conclusions. Generally, endogenous institutional contradictions and/or exogenous variables, such as shocks and crises, turn social actors into agents of change. These actors can be both aware of these uncertainties and capable of making problems known, framing solutions to those problems, and motivating other actors to deal with the contradictions identified. Such conclusions demonstrate that agents of change who initiate institutional change projects are purposeful actors. They often cause other social actors to pay attention to such problems using their network connections, discursive activities and other strategic actions.

New standards are used to reduce the uncertainties or contradictions associated with existing standards. I would suggest that not only are the characteristics of standards similar to those of institutions, but processes of standardisation are similar to those of institutionalization. Both these processes are understood as cyclical processes (Zucker,

1988; Anderson & Tushman, 1990). Standards and institutions aim to remove existing misalignments with the interests of social actors. When they are adopted as dominant, due to the bounded rationality of human beings, these dominant standards and institutions may be the cause of additional contradictions and changes to processes.

In processes of institutional change, the response of focal firms may or may not increase the commitment of the audience to the status quo (Cooper & Schendel, 1976). This is because, all social actors – agents of change among them – are embedded in interconnected networks. Existing institutions are connected by industry-wide procedures, traditions and techniques which permit technical problem-solving to occur incrementally (Constant, 1980). Once firms intend to institutionalize new institutional arrangements in a particular field, they may bring the whole community into a period of chaos or turbulence (Tushman & Rosenkopf, 1992). During the process, other organizations in the field may resist change, or be forced to rethink the reasoning behind existing institutions. As I argued in Chapter 2, focal firms must invest considerable costs and develop strategies in order to achieve their goals.

Existing studies of institutional change focus on purposeful actors and their deliberate actions. The essential issues are networks and identities. Firstly, networks are the basis of processes of institutionalization (Zucker, 1988). Zucker claims that organizations are pressured to become increasingly similar, sometimes because of their network connections with other organizations. These connections mean that agents of change are embedded in a particular field. It is difficult to change institutions without altering other elements with which they are interconnected (Zucker, 1988). Similarly, rationalized myths (Meyer & Rowan, 1977) are also seen as mechanisms which produce similarity

between organizations. Rationalized myths turn social purposes into rational ones, and hence specify technical rules for them. In short, they suggest that procedures can be used to order and control human behaviour in various ways. They are also highly embedded in society and thus are beyond the influence of any individual. This means that they are taken for granted without being questioned (Meyer & Rowan, 1977).

Secondly, organizational institutionalism studies suggest that agents of change can purposefully change institutionalized meanings, and utilize the network connections in their field. In short, networks and institutionalized myths can be seen as conduits of institutionalization while projects of change are initiated. Agents of change should also develop strategic actions which promote their vision of change through these conduits. In institutional change processes, particular agents of change, known as ‘institutional entrepreneurs’, ally themselves with other participants in order to establish collaborations. They utilize networks to diffuse the ideas of change projects and to construct their meanings. They motivate other companies in the same field to establish collaborations, the goals of which are to legitimize their projects and to strive for exclusive support from stakeholders in their field. This process of institutional entrepreneurship can be seen as the ‘activities of actors who have [an] interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones’ (Maguire et al, 2004: 957).

I will discuss the four elements of the institutional change process in organizational institutionalism: institutions, actors, networks, and identity. The strategic actions initiated by institutional entrepreneurs will be discussed in the next chapter, which is devoted to institutional entrepreneurship.

3.2. Relationships between Institutions, Social Actors, Identity and Networks

The definition of institutions in this study represents two saliences. Firstly, institutions explain ‘what is and is not’ to social actors in given fields. They are understood as substantive guides to the actions of social actors. This salience reflects the traditional definition of institutions as being the “establishment of relative permanence of a distinctly social sort” (Hughes, 1936: 180). Secondly, this definition also states that institutions are the products of specific actions which are taken by social actors in order to reproduce and alter them. This salience reflects the viewpoint of organizational institutionalism. I will mainly focus on this second salience, and explain ‘how institutional entrepreneurs use institutional entrepreneurship to defeat competitors in institutional change processes.’ The view of this study is therefore that institutions can be changed, even by actors who are embedded within them.

3.2.1. Social Actors

Why social actors become institutional entrepreneurs? In studies of institutional change, environmental shocks, crises and institutional contradictions lead to uncertainties within fields. In environmental terms, uncertainties are ‘the degree to which future states of the world cannot be anticipated and accurately predicted’ and, in economics, refers more precisely to situations in which actors cannot define rational strategies because they cannot calculate probabilities for the outcomes of decisions (Beckert, 1999). In endogenous terms, institutional contradictions refer to “misalignment[s] between the existing social arrangements and the interests and needs of actors who constitute and

inhabit those very arrangements” (Seo & Creed, 2002: 232). The concept of contradiction is of critical importance to an understanding of endogenous change in institutions. This is because these contradictions result from the bounded rationality and/or network connections possessed by human beings. Social actors have bounded rationality (Williamson, 1981). It results in institutions which are produced and reproduced by the sequential actions of actors and are incomplete. Thus, institutional contradictions are inevitable in institutions (Seo & Creed, 2002).

Not every social actor can be aware of those existing institutions which do not meet their needs and interests (Seo & Creed, 2002; Fligstein, 1997). At the same time, not every social actor can mobilize a collective understanding of their conditions and of themselves, and take collective action to reconstruct the existing institutional arrangements and themselves. Having these critical awareness and understandings, these actors should also have political and strategic actions embedded in a interconnected institutional setting. If this is the case, they can be called institutional entrepreneurs.

3.2.2. Networks

DiMaggio (1988) suggested that the institutional change process can follow an internal logic of contradiction which causes institutionalization to proceed. Scott (2003) suggests that institutions are able to “provide stability and meaning to social life” (p. 48), by using symbolic and relational systems, routines and artifacts in processes of institutionalization. Symbolic and relational systems communicate this information through network connections. Routines and artifacts represent particular meanings to

the audience who will recognise their characteristics and locations. For these reasons, I would suggest that networks and identity are also the important mechanisms in processes of institutional change.

Networks may cause institutional contradictions or make some social actors aware of these contradictions. As social network studies demonstrate, social connections can cross the boundaries between organizations and fields. They not only constrain people, but also act as conduits which communicate information across organizations or their equivalents. For this reason, networks are essential mechanisms for the triggering of both isomorphism (DiMaggio & Powell, 1983) and processes of institutional change (Battilana, 2006; Battilana, et al., 2009).

Generally speaking, networks increase coherence and interconnections in a social system. According to Zucker (1988), networks can also increase the stability of those institutions in which all social actors are embedded in institutionalized fields. The organizational field is defined as “those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies and other organizations that produce the service or products” (DiMaggio & Powell, 1983: 148). This approach is similar to the stakeholder theory discussed in chapter 2. In terms of the organizational field, organizations can be seen as nexuses of relationships with other organizations. According to this conception, networks also play a critical role in organizational institutionalism.

However, because network connections may cross the boundaries of organizational and institutional settings, they may, directly or indirectly, cause contradictions. In the direct

effect aspect, networks may interfere with existing institutional environments in which social actors are embedded (Emirbayer, 1997; Emirbayer & Mische, 1998). Networks may introduce institutional arrangements which have been produced by other fields and may counteract the current institution. For example, Cooper and his colleagues (Cooper, Hinings, Greenwood, & Brown, 1996) posited a process in which such institutional contradictions are common, rather than a distinct transformation in which one logic does away with another. This is because it can be said that institutional contexts comprise different layers, and are interconnected. When one institution changes, it could cause other institutions to change as well. If this is case, incompatibility may be the result.

In the indirect effect aspect, according to Bourdieu (1990), fields are structured by systems of networks within which competitions take place over resources, stakes and access. Depending on the positions which actors occupy in networks, those actors have different views of the field and different levels of access to resources in those fields (Bourdieu, 1990). In other words, they are competing for resources. New ideas, whose aim is the further acquisition of resources, may be provoked by both weak ties (Granovetter, 1975) and strong ties (Hansen, 1999). In this way, networks may introduce opportunities to social actors, and then cause them to become institutional entrepreneurs.

Networks can assist institutional entrepreneurs to disseminate their rationalized myths in a variety of ways (Owen-Smith & Powell, 2008). According to DiMaggio and Powell (1983), the growth of professional networks has been responsible for disseminating a variety of organizational practices in different fields. Thus, networks are essential

elements in the establishment of connectedness in organizational fields (Lauman, Galaskiewicz, & Marsden, 1978). Networks can shape patterns of information exchange, and create a set of structures which channel the flow of information and personnel within a particular field. When a firm is positioned in a central position in such a field, it can easily disseminate information and resources to other points in that field. Its practices can also be disseminated to other firms using personal flow. These other firms will imitate the practices of the central firm in order to decrease uncertainties (Dimaggio & Powell, 1983).

3.2.3. Identity

Identity can be viewed as an important mechanism which links institutions and the actions of social actors (Friedland & Alford, 1991; Glynn, 2008; Thornton & Ocasio, 2008). The construction of identities has been associated in many studies with the development of professions (Brock, Powell & Hinings, 1999; Covalleski, Dirsmith, Heian & Samuel, 1998, DiMaggio & Powell, 1983). An emphasis on the construction of identities was at the heart of institutional studies (Zilber, 2008). Meyer and Rowan (1977) used 'institutional myths' to emphasise the importance of identities in processes of institutionalization. They stated that institutionalized myths relate to 'rationalized and impersonal prescriptions that identify various social purposes as technical ones and specify in a rule-like way the appropriate means to pursue these technical purposes rationally ... [These myths are] beyond the discretion of any individual participant or organization ... [They are] taken for granted as legitimate, apart from evaluations of their impact' (1977: 343-344). Instead, according to studies of institutional change, the

task of constructing identities is central to the creation, framing and maintaining of institutions (e.g., Lok, 2010; Creed, DeJordy, & Lok, 2010).

The construction of identities is central to institutional change because it describes the relationship between social actors, networks and the field in which they operate (Bourdieu & Wacquant, 1992). Institutions can be seen as being systems of meaning. Recent studies of institutional change have suggested that institutions can be influenced through the 'construction' and 'performance' of particular identities (Suddaby & Greenwood, 2005). Institutional entrepreneurs can find a solution to institutionalized claims of incompatibility, and change the enactment of their institutional roles with a reconciled identity. In change processes, institutional entrepreneurs should promote new arrangements through subsequent identification with the proffered new identity (Thornton & Ocasio, 2008). For these reasons, the construction of identity is central to the attempts of institutional entrepreneurs to frame the need for change (Greenwood, et al., 2002).

Institutional entrepreneurs are also embedded in existing institutions. When they wish to demonstrate that they are credible agents of change projects, they should build on the discourses already established by existing institutions. If they do not do this, they may fail to obtain sufficient resources because of a perceived lack of legitimacy (Pfeffer & Salancik, 1978; DiMaggio & Powell, 1983; Zucker, 1988). Such discourses also convey socially constructed meanings beyond their intrinsic content or evident functional use (Morgan, Frost, & Pondy, 1983). As a result, institutional entrepreneurs can shape the perceptions and interpretations of audiences, and then construct new identities. By using the artifacts and practices, institutional entrepreneurs can communicate their

performance to their audiences through symbolic and relational systems which are embedded in their particular field (Scott, 2003).

3.3. Social Actors

This study defines institutional entrepreneurs as purposeful actors who possess critical thinking and awareness concerning existing institutional contradictions. The existing literature suggests that the social position of institutional entrepreneurs in the network (Battilana, et al., 2009) and the strategic capabilities of such entrepreneurs (Seo & Creed, 2002) play critical roles throughout the process.

Previous institutional theorists have not presented an “explicit or formal theory of the role that interests play in institutionalization, and which consequently de-focalize, or distract attention from, the ways in which variation in the strategies and practices of goal-directed actors may be related to variation in organizational structures, practices, and forms” (DiMaggio, 1988: 4). Although they have not denied the importance of goal-directed behaviours, they have tended to ignore the role played by the interests of social actors. From the 1990s onwards, more and more studies have attempted to study the active role of organizations in institutional settings (e.g., Oliver, 1991; Oakes, Townley & Cooper, 1998). These studies developed the idea that institutions not only constrain the behaviour of social actors but also provide the basis for strategies.

Rather than seeing them as conformist, scholars prefer to view social actors as knowledgeable agents who have the capacity of reflexivity (Giddens, 1984; Garud & Karnøe, 2003). Seo and Creed (2002) further show that embedded actors are capable of

perceiving and recognizing their own needs and opportunities, together with appropriate courses for collective action which can change existing institutional arrangements when institutional contradictions emerge. Battilana et al. (2009) suggest that the position of social actors in networks is also a factor which causes them to become institutional entrepreneurs. They further suggests that central network positions are more likely to cause their owners to access more resources, and nurture and develop their capabilities.

3.3.1. Social Position

The positions of social actors in networks may affect their views, resources and information flow, as well as the likelihood of their becoming institutional entrepreneurs. This is because social position may affect not only an actor's perception of a field (Bourdieu, 1977), but also his/her accessibility to the resources which are needed to engage in processes of institutional change (Lawrence, 1999).

The importance of the social position of an institutional entrepreneur is more relevant to centrality and to structural holes in networks. In network analysis, degree centrality and betweenness are useful tools for understanding the role of social position. 'Degree centrality' is defined as the number of links incident upon a node. 'Degree' is often interpreted in terms of the immediate ability of the node to apprehend whatever information is flowing through the network. 'Degree betweenness' is defined as a centrality which can be understood as direct links within a network. Direct links occur when many of the shortest paths between other links have higher betweenness than the longer paths. If firms have a greater degree of centrality and betweenness, they will have more constraints on their actions. Those actors who possess central network

positions are more likely to retain existing institutions in order to maintain their own vested interests. In turn, many institutional studies have explored the idea that peripheral actors in the network are more likely to initiate projects of institutional change (e.g. Garud et al., 2002; Haveman & Rao, 1997; Hirsch, 1986; Kraatz & Zajac, 1996; Leblebici, et al., 1991; Tushman & Anderson, 1986). However, some recent studies have found that such change can be initiated by powerful organizations (e.g., Greenwood & Suddaby, 2006; Greenwood et al., 2002; Sherer & Lee, 2002), which are said to be at the centre of a network (Shils, 1975).

Secondly, the term ‘structural holes’ refers to the absence of ties between two parts of a network (Burt, 1992). Actors need ‘bridges’ in order to cross the gap between two separate groups in a network. A bridge is manifested in an actor’s network of relationships when the focal actor is tied to others who are not themselves connected (Burt, 1992). If an actor possesses a bridge, that actor will have considerable advantages in terms of range (Reagans & McEvily, 2003), brokerage (Xiao & Tsui, 2007; Fleming & Waguespack, 2007), and efficient and non-redundant accessibility to resources and information. Network positions can provide focal actors with opportunities that shape intentions to capture “accumulative advantage“ (Zaheer & Soda, 2009). Such advantages can amplify future change in the structural characteristics of networks by reinforcing the brokerage position of prominent actors over time (Fleming & Waguespack, 2007).

If they possess degree centrality, betweenness and structural holes in networks, social actors become more capable of becoming institutional entrepreneurs and initiating projects of institutional change. Although some studies claim that these central actors

are committed to existing institutional arrangements, such network properties enable these central actors to contribute solutions to problems and referral, together with problem reformation, validation and legitimation (Cross & Sproull, 2004).

3.3.2 Capabilities to Manipulate Discourse

The capability to communicate is the essential issue in Fligstein's studies (1997, 2001). Many studies, including his, have demonstrated the importance of discourses in institutional change (e.g. Fligstein, 1997, Lawrence, et al., 2002; Rao, 1998; Greenwood & Suddaby, 2006; Munir & Phillips, 2005; Zilber, 2007). Hardy, et al. (2005) suggest that institutional entrepreneurs can strategically maneuver discourses to mobilize collaboration, increase the commitment of participants, and establish identities. In addition to this, according to an early approach (e.g., Meyer & Rowan, 1977; DiMaggio & Powell, 1983), discourse can be used to institutionalize myths and rationalize prescriptions that "identify various social purposes as technical ones and specify in a rule-like way the appropriate means to pursue these technical purposes rationally" (Meyer & Rowan, 1977: 343). In this section, which deals with the capabilities of social actors, the focus will be on the ways in which institutional entrepreneurs manipulate discourses to construct meanings and establish identities in their processes of institutional change.

Discussing the role of discursive activities in institutional change processes can further strengthen the role of frame in standard wars. By using frame to audience, institutional entrepreneurs should employ various discursive practices, including narratives, rhetorics, and so on. Because, for many social actors, a new technical standard is a new

idea to solve the existing standard which is misaligned with social actors' requirements. In order to successfully standardize a new standard, a focal firm should persuade audiences to accepting the idea. These discursive practices aim at retaining and sustaining the influence of discourses in audience's mind. The goal is to change their minds and motivate them to adopt specific standards.

Surprisingly, the role of discursive activities has not been paid much attention in empirical standard wars studies. Especially, scholars did not discuss institutional entrepreneurs' detailed practices of discursive activities in the limited studies (Munir & Phillips, 2005; Suddaby & Greenwood, 2005). Suddaby and Greenwood indicate that describes the role of discursive activities in legitimating profound institutional change. They describe how the purchase by a Big Five accounting firm triggered a struggle within accounting and law over a new organizational form, named as multidisciplinary partnerships. They analyze the discursive struggle that ensued between proponents (the Big Five accounting firms) and opponents (other accounting firms) of the new organizational form (multidisciplinary partnerships) in 1977.

According to the study, institutional entrepreneurs are likely to use discourses to capture the attention of audiences and influence their perceptions, before obtaining legitimacy from them (Suchman, 1995). In practice, timing, place and audience characteristics are also crucial when using discourses to construct the meanings of identities. These characteristics have not been paid attention in the relevant studies. For example, professional technological exhibitions and conferences are crucial places for the presentation of discourses. Firms can contact many professional media, companies from many relevant industries, buyers and many other potential stakeholders in one place.

Institutional entrepreneurs can also present less professional discourses in such media. They can also construct a general consensus or identity which explains or diffuses the new technological standard to the audience. Chapter 2 has discussed frames, collaborations, network effects and product performance. These four attributes are all strongly related, to some extent, to discursive activities.

3.4. Networks

The core ideas of social networks are embeddedness (Granovetter, 1985; Uzzi, 1996); the utility of network connections (Burt, 1992; Nahapiet & Ghoshal, 1998); and social relations (Freeman, 2004). New theories and research relating to network theory is derive from these ideas (Kilduff & Brass, 2010). Embeddedness has been discussed in previous chapters, which have suggested that, institutional entrepreneurs are embedded in existing institutions. Utility and social relations demonstrate that institutional entrepreneurs can and must access resources and information through networks. This section will discuss the role played by these two ideas in processes of institutional change.

3.4.1. The Utility of Network Connections

The term ‘utility of network connections’ refers to those connections that both constrain and facilitate outcomes which are important to individuals and groups (Kilduff & Brass, 2010). Networks can assist social actors to learn the characteristics of a particular field (including environmental and firm-level factors), and further explore opportunities in that field (Battilana et al., 2009). Networks correspond to the set of social actors to

whom they are directly linked (Aldrich, 1999); affect their perceptions of their particular field, and, as a result, their likelihood of becoming institutional entrepreneurs (Dorado, 2005; Battilana et al., 2009). Central actors are more easily able to observe different types of contradictions or field-level conditions and to take the opportunities afforded by networks. In turn, they are more likely to establish collaborations in order to share and exchange opinions and information, before obtaining collaborative benefits (Kilduff & Brass, 2010).

In addition to environmental and firm-level factors, networks can make social actors aware of the degrees of heterogeneity and institutionalization in an institutional setting. Firstly, as discussed above, the heterogeneity of institutional arrangements in a field can be diffused and penetrated through network connections. They are likely to give rise to institutional incompatibilities that can become a source of internal contradiction. Thus, network connections can stimulate and assist social actors to explore opportunities, and then cause them also to become institutional entrepreneurs.

Secondly, a degree of institutionalization may influence social actors to become institutional through affecting the agency of actors (Tolbert & Zucker, 1996). Lower levels of institutionalization are associated with higher levels of uncertainty in the institutional context, so that they may provide opportunities for institutional entrepreneurs (DiMaggio, 1988; Fligstein, 1997; Phillips et al., 2000). This view does not imply that higher levels of institutionalization cannot be conducive to institutional change. Highly institutionalized fields can also be changed by institutional entrepreneurs (Beckert, 1999). The ownership of different social positions and network connections can lead to different degrees of information access. Battilana et al (2009)

suggest that, this can result in social actors becoming institutional entrepreneurs and so initiating institutional change processes.

3.4.2. Social Relations

According to studies of institutional change, social relations enable institutional entrepreneurs to obtain information and political support. Institutional entrepreneurs can utilize social relations to motivate others to establish collaborations. These social relations may also enable institutional entrepreneurs to champion and orchestrate collective action among diverse stakeholders (Maguire et al., 2004).

According to the relevant studies, institutional entrepreneurs use their position and relations to access resources and enhance the legitimacy of their projects of change. In regard to structural holes, institutional entrepreneurs may act as brokers who mediate on behalf of the mutually established best interests of different groups (Fligstein, 1997). For example, before the European Union single market was launched, the eighth President of the Union, Jacques Delors pursued strategies to mediate between the disparate members of the EU. Before becoming President, Delors toured European capitals to speak to those governments who were no longer engaged in dialogue. Delors told them that the EU had to launch a range of projects in order to move forward. Eventually, the single market emerged as the most viable project in the history of the EU. In this way, Delors acted as a broker to introduce the vision of the EU to its member states and to persuade them of its vision.

In addition to this, institutional entrepreneurs also make use of the centrality associated with their social relations within the network. Their reach centrality is defined as the access they have to a large number of members of the network through a limited number of intermediaries (Oliver & Montgomery, 2008). If they are not central in a field, they may seek to make connections with actors who do have such reach centrality (Battilana et al., 2009). In this way, institutional entrepreneurs are able to secure support and endorsement from other actors and gain access to the resources they control (Deepphouse & Suchman, 2008). They can enhance the legitimacy of their projects of change by mobilizing support for them among such stakeholders as highly embedded agents (Lawrence et al., 2002), professionals and experts who operate at the centre of the relevant field (Hwang & Powell, 2005), and so forth.

3.5. Identity

Identity is thought to form a link between institutions and organizational behaviour (Friedland & Alford, 1991; Thornton & Ocasio, 2008; Lok, 2010). The concept of identity has given rise to various issues that deserve our attention and are central to the current institutional research agenda. These include a focus on actors and interests (e.g., Lawrence, Suddaby & Leca, 2009); the socio-political context and embeddedness of agency (e.g., Clemens & Coot, 1999); frames (e.g., Kaplan, 2008); and institutional entrepreneurship (e.g., Hardy & Maguire, 2008). Constructing identity is also to construct common understandings and meanings for the new institution, and to convey them to other social actors who are embedded in the particular organizational field. When an institution is created, stakeholders and other prospective organizations in the given field will be uncertain about its nature or its future performance. In a context of

such uncertainty, institutional entrepreneurs need to understand the situation before they can act (Weick, 1995).

Most studies of technological change have focused on the role taken by the actions of producers in shaping the direction of a technology (e.g. Utterback, 1994). Except Kaplan and Tripsas (2008), although many studies have attempted to provide an integrated framework to explain the road map for dominant design (Suarez, 2004; Murmann & Frenken, 2006), they do not pay attention to the roles played by identity and cognition. This is because the identity of new institutions is generally treated as the temporary outcome of a struggle between institutional entrepreneurs. It is seen as the outcome of a truce until the start of the next episode of institutional contradictions or standard wars (Suddaby & Greenwood, 2005). For this reason, to discuss the role of identity is not only to demonstrate its importance in studies of institutional change but also to complement studies of standard wars.

Identity construction aims to establish clear boundaries (Lamont & Molnar, 2002) which can help institutional entrepreneurs to establish stable identities for those people who exist within the institutional boundary (DiMaggio, 1987; Douglas, 1986; Mohr & Duquenne, 1997). Institutional entrepreneurs and those who interact with them can make differences to institutions and similar organizations.

A new identity should be able to affect audiences' perceptions of new institutional prototypes (Verdaasdonk, 2003; Espeland & Stevens, 1998; Zuckerman, 2004), and of their value (Zuckerman, 1999). Although establishing identities is understood to be an institutional resource (Rao, et al., 2000), activities which establish new identities should

be aligned with the previous activities of the institutional entrepreneur, as well as the existing institutional context (Lounsbury & Pollack, 2001). This is because both existing institutions and newly created ones are embedded in broader interpretations of the accepted cultural history of a field. The existing meanings both shape and constrain the audience's interpretations. To some extent, these meanings predetermine the development of new institutional identities (Khair & Wadhvani, 2010). In other words, the content of a new identity should not be too radical, or, it will not be easily accepted and understood by the audience.

There are many different institutional prototypes in the change process. These different institutions have competitive relationships with each other, and are seen as battling with each other for supremacy until eventually one institution defeats all the other prototypes and becomes, temporarily at least, the new dominant institution (Goodrick & Reay, 2011). Within this process, institutional entrepreneurs should ally themselves with other participants in order to construct a specific identity for the promoted institution. This identity should be capable of responding to most of the stakeholder's requirements.

Thus, the identities of new institutions should be able to guide stakeholders and consumers towards commonly held assumptions about the comparability, relative value and similarity of products in the process (Urban, Hulland, & Weinberg, 1993; Zuckerman, 1999). These shared understandings allow for assessments of value, and for smooth transformations between different institutional domains (Hsu & Hannan, 2005; Lounsbury & Rao, 2004). In turn, institutional entrepreneurs must rely on their ability to mobilize other actors to establish collaborative frames and identities which can critically

engage with historical meanings in ways reinterpret the history of the field and its logics of new institutions.

In studies of both institutional theory and technology management, using discursive activities is seen as a critical facet of the construction of identity through networks, routines, and artifacts, in what are called 'institutional conduits'. Using discursive activities echoes the importance of symbolic systems and artifacts in processes of institutionalization (Scott, 2003), and responds to the role of framing in standard wars (Kaplan & Tripsas, 2008). In addition, students of technology management suggest that producers of new technologies can shape the performance criteria which are applied in the new domain (Moreau, Markman, & Lehmann, 2001).

3.6. Conclusions

Chapter 3 has discussed the idea that social actors, institutions, networks, and identity are the four critical elements in processes of institutional change. This chapter has also suggested that institutional entrepreneurs can use their positions and relationships, together with their ability to construct the meanings of new institutions, and shape identities into new myths and then institutionalize them through networks.

Technological change can be seen as a kind of institutional change. Networks and identities can result in the stability of institutions. As a result of the connections of networks with other organizations, those organizations are pressured to become similar to other organizations in the same domain. These network connections make it difficult to change any one element without altering other interconnected elements (Zucker,

1977). Identities emerge from rational myths, and in studies of institutional isomorphism, they are seen as the mechanisms that create similarity between organizations.

Studies of institutional change focus on the fact that institutional contradictions are inevitable in institutional domains. Moreover, exogenous variables may also make existing institutions incompatible with new interests which result from unexpected events or technological upheaval. These contradictions and uncertainties cause social actors who possess reflexivity, knowledge, a critical social position and understanding to reflect, consider and act in ways which run counter to the taken-for-granted rules. This chapter also suggests that social actors who have a central position in networks can sense the degree of heterogeneity and institutionalization in those networks, and then create fresh opportunities for new institutions. These critical positions put these actors in a privileged position to access first-hand information about opportunities, and to control the information flow. In addition, these actors need to be especially skilled in the manipulation of discourses to shape meanings and establish identities. As a result, they are able to define the boundaries of new institutions and differentiate their advantages from those of other options. To summarize, institutional entrepreneurs can manipulate strategies and use the advantages conferred by networks and identity construction to institutionalize their new institutions.

This chapter has mainly focused on the discussion of institutional change and the role of four critical elements in processes of institutional change. These elements respond to the four attributes of standard wars, frame and collaboration in particular. However, although we have discussed the similarities between institutional change and standard

wars, this does not mean that we can simply integrate these different viewpoints to explain and answer the research question of how firms defeat competitors in standard wars. In Chapter 2, I asserted that firms should ally themselves with critical stakeholders in order to jointly develop new standards, and to obtain their endorsement as a form of legitimacy. Chapter 3 showed that the degree centrality, betweenness, and structural holes possessed by social actors can gain them the resources required (such as reputation) to become institutional entrepreneurs. Earlier studies also demonstrated that conflicts of interest existed in the early development of institutional theory. Although the issues of power and influence have been given less attention in recent years, they are central to the development of institutional theory. Greenwood and Hinings (1996) suggested that we should associate them with different perspectives of institutional theory to provide a comprehensive viewpoint on studies of institutional change.

As a result, we need a general theoretical framework to explain how institutional entrepreneurs strategically achieve institutional change. Moreover, within this process, institutional entrepreneurs should be able to manage critical stakeholders, collective action and discursive activities. This study makes use of institutional entrepreneurship to discuss and explain the processes involved in the strategic actions of institutional entrepreneurs in processes of institutional change. Chapter Four of this study will discuss institutional entrepreneurship.

Chapter 4. Institutional Entrepreneurship

4.1. Introduction

In Chapters 2 and 3, I argued that processes of institutional change are initiated by these critical factors. Those discussions provided a plausible explanation of the greater ability of central organizations in networks to initiate processes of institutional change. This was essentially because these central organizations possess a certain degree of power and legitimacy. Their power and legitimacy can be seen as resources which they accumulate from the performance of existing products. In this way, when they initiate processes of institutional change, their activities can easily gain the attention of critical stakeholders, prospective organizations and the media. As a result, an effective study should consider not only the critical elements discussed in Chapters 2 and 3 but also power and legitimacy. If institutional entrepreneurs do not possess these resources, new institutions will be ignored as entropies (Zucker, 1988).

In order to understand the importance of these resources, one should start by examining the origins of institutional entrepreneurship. The concept of institutional entrepreneurship is produced by integrating the concepts of institution and entrepreneurship. Traditional entrepreneurship theory explains the actions of entrepreneurs who undertake innovations and gain business understanding in an effort to transform innovations into economic goods in the business world. In contrast, institutional entrepreneurship is clearly in line with the tradition of research that views entrepreneurs as agents who create new business models for the businesses they initiate (Lumpkin & Dess, 1996; Schumpeter, 1942). This theory also combines ideas from

studies of social movement (e.g., Jenkins, 1983; McCarthy & Zald, 1977; Snow & Benford, 1988; Snow, Rochford, Worden & Benford, 1986), the aim of which was to study the non-business world. As a result, the opening of Section 4.2 will further discuss the distinctions between institutional entrepreneurship and entrepreneurship.

This study will also suggest that we can understand the importance of power and legitimacy in institutions by examining the development of institutional theory. Different facets of organizational institutionalism have been identified during its development from 1977 (Greenwood et al., 2008). Before 1977, the early viewpoint of institutionalists emphasised issues of conflict, power and influence. Organizational institutionalism focuses on routine and isomorphic pressures which are oriented towards isomorphism in organizational fields (Lawrence, 1999). This study will also demonstrate that social actors have the ability to change existing institutions. Although the issue of power has been given less attention in studies of organizational institutionalism, it is central to the development of institutional theory. For this reason, although this study will certainly use ideas of organizational institutionalism to explain institutional entrepreneurship, I also suggest that the issue of power should be associated with this approach. It can widen our understanding in studies of institutional entrepreneurship and institutional change.

Chapter 4 has several sections. Section 4.2 will provide an overview of institutional entrepreneurship. The study will argue that both perspectives are based on egoism in this section. Institutional entrepreneurs can earn economic returns by changing the arrangements of existing institutions. Moreover, this section will emphasise the role of legitimacy in institutional entrepreneurship. Section 4.3 will discuss the role played by

power in organizational institutionalism. Although many studies of institutional change have given much more attention to the importance of cognition, the study suggests that we also cannot ignore power. Section 4.4 will argue that power, legitimacy, collective action and discursive activities are the four attributes of institutional entrepreneurship. Sections 4.5 to 4.8 will discuss each attribute separately. Finally, Section 4.9 will conclude Chapter 4.

4.2. The Overview of Institutional Entrepreneurship

The conception of institutional entrepreneurship is similar to DiMaggio's (1988) view of institutional change. He argues that "new institutions arise when organized actors with sufficient resources see in them an opportunity to realize interests that they value highly" (DiMaggio, 1988: 14). According to DiMaggio's viewpoint, the conception of institutional entrepreneurship reintroduces the importance of conflicts of interest in organizational institutionalism.

Clarifying the difference between entrepreneurship and institutional entrepreneurship can assist us in understanding that the power and legitimacy of institutional entrepreneurs should be discussed in studies of institutional change.

Institutional entrepreneurship is associated with ideas of institutions and entrepreneurship. Institutions can be seen as performance scripts which provide "stable designs for chronically repeated activity sequences" (Jepperson, 1991: 145). Any deviation from this produces institutions that are counteracted by sanctions or are costly in some way (Garud, Hardy & Maguire, 2007). In studies of entrepreneurship, however,

it is seen as “an engine of economic growth with the introduction of new technologies and the consequent potential for obsolescence serving to discipline firms in their struggle to survive perennial gales of creative destruction. The disruptions generated by creative destruction are exploited by individuals who are alert enough to exploit the opportunities that arise” (Kirzner, 1997; Shane & Venkataraman, 2000; cited from Garud et al., 2007: 959-960). Studies of institutions focus on continuity while studies of entrepreneurship focus on change but suggest that it is difficult to accomplish. However, the difference between entrepreneurship and institutional entrepreneurship remains fairly unclear today.

Li, et al. (2006) demonstrate that institutional entrepreneurs are businessmen/women who expand their business ventures and need to destroy the prevailing non-market institutions in order for their ventures to be successful. However, this definition excludes some social or political factors. The next cases show that even social actors who do not work in business or commerce can become institutional entrepreneurs, and adapt existing institutions to suit their interests. For example, Holm (1995) analyzed the institutional battle between fishermen and fish merchants in Norway. He described the “rise and fall of a specific institutional form, the mandated sales organization (MSO), in Norwegian fisheries” (Holm, 1995: 398). His study focused on the interconnection between practical and political levels of action and the interaction between practices, interests and ideas. The MSO idea was in conflict with the economic interests of Norwegian fishermen. In order to create a new institution to benefit their own economic interests, Norwegian fishermen used power strategies in political way to change the practices of the MSO in order to protect their own power (i.e. their economic interest).

Holm's study also points out issues of legitimacy in studies of institutional entrepreneurship. The Norwegian MSO was created in 1929 in a process that was full of conflict. "During the next decade, the MSO form gained legitimacy and proliferated rapidly throughout the [fisheries] sector. Between 1950 and 1980, the MSO form was institutionalized and remained a taken-for-granted part of the sector. Then, during the 1980s, the MSO form lost legitimacy, and the number of MSOs rapidly declined." This was because, in the 1980s, liberalist ideas took on a new legitimacy in many Western countries. De-regulation and privatization were central to the "new right" movement, and so the MSO case reflected a broad ideological shift. This case also conforms to the expectations of organizational institutionalism. Within this perspective, we see the proliferation throughout society of new institutional forms, which are adopted as the rationalized myths on which their legitimacy rests (Meyer & Rowan, 1977; DiMaggio & Powell, 1983).

4.3. The Role of Power in Organizational Institutionalism

The essential intention of organizational institutionalism is to "understand how organizational structure and processes acquire meaning and continuity beyond their technical goals" (Suddaby, 2010: 14). Suddaby (2010) indicates that organizational institutionalism owes a debt to the views of Zucker (1977), Meyer and Rowan (1977), and DiMaggio and Powell (1983). Firstly, Zucker (1977) described the ways in which actors use cues from the organizational environment in which they are embedded to attribute meaning to events. Secondly, Meyer and Rowan's (1977) theory of institutional myths argued that the formal structures of organizations represent the myths of their environments rather than the needs of their activities. Thirdly, DiMaggio and Powell

(1983) suggested that organizational isomorphism results when firms have a similar structural position in the organizational field.

Phillips and Malhotra (2008) derive a more restricted view from these classical works of organizational institutionalism, indicating that the nature of institutions is primarily cognitive⁴. They suggest that social rules, norms and other institutional practices are capable of enabling and constraining the actions of actors. These shared understandings result in certain organizations having to perform certain activities regardless of their purpose. This is because they have a taken-for-granted nature of those shared understandings. In other words, “actions do not become institutionalized by themselves but only when they become understood in a particular way” (Phillips & Malhotra, 2008: 713). In organizational fields, because of their similar structural position, organizations will become isomorphic within a common institutional environment (Suddaby, 2010).

However, it is too risky to underemphasize the role of power, in the manner of these early studies. Indeed, cognition is one of the critical elements which have been discussed in Chapters 2 and 3. This study does not claim that institutions are only constructed using cognition. As discussed above, organizational institutionalism is rooted in the views of early institutionalists. These early views were affected by the ideas of classical sociologists. For example, Spencer argued that social systems are

⁴ Several recent studies elaborate the role and importance of cognition in organizational institutionalism (e.g., Phillips & Malhotra, 2008; Thornton & Ocasio, 2008, 1999). Institutional logics is defined as overarching sets of principles that prescribe “how to interpret organizational reality, what constitutes appropriate behavior, and how to succeed” (Thornton, 2004: 70). Institutional logics provide guidelines on how to interpret and function in social situation. In order to gain endorsement from important audiences and because logics provide a means of understanding the social world and for acting confidently within it, organizations comply with these logics. For instance, in the BD-HD DVD standard war, Hollywood studios and customers possessed different logics. The former asked institutional entrepreneurs to pay attention to copyright protection while the latter requested opening of the protection mechanism. Thus, how to respond to these different institutional logics is one of the main questions in institutional theory.

made up of a series of subsystems in which institutionalized structures perform distinctive functions for societies. He argued for the utilitarian view that social structures arise through a process of competition and exchange between social actors, who are rationally pursuing their own self-interests. When institutionalized arrangements fail to allow actors to achieve their objectives, they are likely to pursue purposeful change (Hinings & Tolbert, 2008).

In early institutionalism, any new interests combined with the existing institutions can be seen as a result of political tradeoff. Institutionalization is one of the methods of preserving the vested interests of power holders. These powerful actors are more likely to maintain the long-term stability of institutions. According to Spencer, powerful actors will force other social actors in the field to accept their interests and join them in changing societal systems. Suddaby (2010) argues in a article about ‘challenges for institutional theory’ that power is largely missing in current efforts within institutional theory to understand why and how organizations attend to their institutional environments. In fact, power was paid much attention in old institutionalism and in the early stage of organizational institutionalism. For example, in studies of decoupling, power mediates the desire to decouple and the action of decoupling (Boxenbaum & Johnson, 2008). Meyer and Rowan (1977) pointed out that organizations share the same environmental pressures that tend to take on a similar form as efficiency-seeking. Decoupled actions mean that the organization abide only superficially to institutional pressures and adopt new structures without implementing related practices. In this vein, scholars suggest that more power increases the resistance of organizations to external pressure for change (Boxenbaum & Johnson, 2008; Pache & Santos, 2010).

The study of institutional stability was more common in early institutionalism the classical sociological view also considers issues of power. For this reason, we cannot ignore issues of power when studying organizational institutionalism.

4.4. The Attributes of Institutional Entrepreneurship

Power, legitimacy, collective action and discursive activities are the four attributes of institutional entrepreneurship (Lawrence, 1999). We can summarize this by saying that, early institutionalism emphasised issues of power and collective action while organizational institutionalism is focused on the ways in which focal firms strategically manage their legitimacy and discursive activities in order to initiate isomorphism and/or institutional change. Lawrence (1999) suggested that ‘the symbolic elements and attention to power associated with the old institutionalism [i.e. early institutionalism] can be brought together with the new institutionalism’s [i.e. organizational institutionalism] cognitive insights and attention to legitimacy, [so that] institutional theory can provide an excellent foundation for understanding the relationship between organizations, their strategies and their institutional contexts’ (p. 162). For this reason, this study defines power, legitimacy, collective action and discursive activities as the four attributes of institutional entrepreneurship.

At Chapter 2, I suggested that the roles of frame and stakeholder should be considered into standard wars studies. The former concept is borrowed from social movement studies. It is also a gap which should be fulfilled in the existing studies. In this chapter, I will further broaden the role of frame to discursive activities. There are many studies have mentioned and discussed the role of discourse in institutional change processes.

However, they are failed to discussing detailed practices in change process. Except from the issue, the relevant studies did not account for the role of critical stakeholder (e.g. Greenwood & Suddaby, 2006; Munir & Phillips, 2005; Garuda et al., 2002). They lack a critical aspect of which institutional entrepreneurs collaborate with and motivate these stakeholders to theorizing specifications of new standards. Thus, the existing empirical studies have also implicitly mentioned the issue of stakeholder but have not paid more attention on the issue. I suggested that the stakeholder issue should be considered as another gap in the existing studies.

Organizational institutionalism is beneficial to the development of studies of institutional change in several ways. Firstly, the study develops a framework to describe the profile of institutional strategies. These strategies are seen as managing stakeholders and other prospective organizations which compete for resources in processes of institutional change. For this reason, we should pay attention to the abilities of institutional entrepreneurs to change existing institutions (e.g., Garud et al., 2002). Because existing institutions penetrate and combine various subsystems and practices, institutional entrepreneurs need to leverage and motivate sufficient resources to alter them, using collective actions (including critical stakeholders) and discursive activities. According to this view, they need to motivate other actors to establish inter-organizational collaborations, a term which refers to cooperative relationships between organizations in which participants depend on neither hierarchical nor market mechanisms of control in order to gain cooperation from each other (Phillips et al., 2000; Lawrence, et al., 2002).

Secondly, as a result of their network positions, especially when they have central positions in networks, institutional entrepreneurs can be empowered by power and legitimacy so that they can create and maintain new institutions. Power and legitimacy can be seen as resources used by institutional entrepreneurs in processes of institutional change. Returning to my first point, by using discursive activities, institutional entrepreneurs can attract the attention of audiences to their previous performance in existing institutional settings. This suggests that institutional entrepreneurs are able to leverage the knowledge, skills and resources and apply them to develop innovative, synergistic solutions to complex problems.

Thirdly, based on the literature of institutional change, these four attributes may have reinforcing effects. For example, Hardy and Phillips (2004) suggest that discursive activities and power may be mutually constitutive. Discourses not only communicate information to audiences, but also construct meanings and influence the perceptions of audiences. In institutional entrepreneurship, discursive activities may shape cognitive, personal, structural, procedural, consequential, dispositional and exchange legitimacy (Zott & Huy, 2007). In turn, discursive activities can be used to construct the legitimacy of a new institution, enhance the power and legitimacy of institutional entrepreneurs, promote product performance, increase network effects, and so on.

4.5. The Power Issue in Institutional Entrepreneurship

There are two types of power, according to studies of institutional entrepreneurship. One of these types is rooted in institutional practices, and the other in the strategic actions of institutional entrepreneurs. This study will call the former type systemic

power and the latter type episodic power (Clegg, 1989; Foucault, 1977; Hardy & Clegg, 1996; Lawrence, 2008).

Power is traditionally seen as a commodity. Social actors can possess it, hold it or keep it in reserve, like the social power described by French and Raven (1959). Instead, this study will argue that power is a relational phenomenon and an effect of social relations, rather than a commodity (Lawrence, Mauws, Dyck & Kleysen, 2005; Lawrence, 2008). Systemic power works through ongoing practices and routines to give advantage to existing institutions. This mode is the traditional focus of institutional theory. It reflects the idea that institutions constrain the actions of actors, in such ways as socialization and technological standards. When the practices of one organization are imitated by another, the knowledge of that organization is professionalized in the other one. To some extent, these benchmarking practices can be seen as the source of power of focal firms. For instance, Meyer and Rowan suggested that powerful myths are “highly institutional, and thus in some measure beyond the discretion of any individual participant or organization” (Meyer & Rowan, 1977: 344). Power is applied in this way, in ongoing practices and routines, which give certain advantages to those organizations which possess power (Clegg, 1989; Foucault, 1977; Laclau & Mouffe, 1985; Lawrence, 2008).

Episodic power refers to relatively discrete strategic acts of mobilization which are initiated by self-interested actors (Clegg, 1989). The episodic approach examines the power in action. Its focus is on how power is used, on how it effects changes through time (Cobb, 1984). It reflects the idea that human beings are knowledgeable actors with the ability to reflect, examine and act in ways which run counter to taken-for-granted

rules (Giddens, 1984). This mode of power has also been the traditional focus of organizational research and theory. This is why social actors are prompted to become institutional entrepreneurs when existing institutions produce contradictions which misalign their interests and needs.

If they well use the power, institutional entrepreneurs can strategically influence and/or compel⁵ other actors in institutional settings through the mobilization of resources, relationships and discursive strategies. As a result, institutional entrepreneurs are more easily able to successfully accomplish institutional change (Garud et al., 2002; Maguire et al., 2004; Suddaby & Greenwood, 2005); construct the identities of actors when putting their institutional strategies into effect (Fligstein, 1997; Greenwood et al., 2002; Hensmans, 2003); influence field development (Greenwood & Suddaby, 2006; Lawrence & Phillips, 2004; Munir & Phillips, 2005); and implement processes by which practices move through time and space (Boxenbaum & Battilana, 2005; Czarniawska & Joerges, 1996).

This study bases its argument on the preceding discussions, and suggests that social relations, network positions, mobilization of resources, and discourse are the four sources of power used by institutional entrepreneurs (Burkhardt & Brass, 1990; Maguire & Hardy, 2009; Whittle, Mueller, & Mangan, 2008). Making use of these elements, institutional entrepreneurs can institutionalize the new institutions associated with their interests into institutional settings. In other words, central players are referred to as social actors who have central positions in networks. They are able to access more

⁵ Influence is understood as the ability of one actor to persuade another to do something they would not otherwise do (Clegg, 1989; French & Raven, 1959; Lukes, 1974). Force, understood as a basis for institutional agency, is associated both with attempts to disrupt institutionalized practices and with efforts to maintain institutions (Lawrence, 2008).

information and obtain more attention from the media by using discursive strategies when they promote their new institutions. Moreover, as embedded actors, central players normally conform with existing institutional settings, and, as a result, possess a certain degree of power. Thus, at the start of a process of institutional change, central actors incur lower costs when establishing their base of power and legitimacy. As a result, this study will claim that central and powerful organizations are more able to become institutional entrepreneurs and initiate institutional change.

4.5.1. The Sources of Power in Institutional Entrepreneurship

Having a central position in a network, institutional entrepreneurs can be more powerful. When this is the case, institutional entrepreneurs are able “to exercise power through constituting alliances, integrating rather than merely dominating subordinate groups, winning their consent, achieving a precarious equilibrium” (Fairclough, 1992: 94). This section will argue that social relations, network positions, and the mobilization of resources and discourse are the three sources of power available to institutional entrepreneurs.

Firstly, central actors are favored by the existing institutional arrangements, which constitute a source of power for them (Fligstein, 1995; Hensmans, 2003). They hold a privileged situation. Compared to peripheral actors, central actors in networks possess higher reputation and status⁶ and a more dominant position (Deephouse & Suchman, 2008). By possessing these attributes, central organizations are able to demonstrate that

⁶ Status is ‘a socially constructed, intersubjectively agreed-upon and accepted ordering or ranking’ of social actors (Washington & Zajac, 2005: 284). Reputation is a generalized expectation about the future behaviour or performance of organizations, which is based on their past behaviour or performance (Ferguson, Deephouse & Ferguson, 2000).

they are trustworthy and reliable. They are able to access greater amounts of information about innovations, new ideas and opportunities.

Secondly, because of their central network position, institutional entrepreneurs are able to obtain more resources. Having sufficient resources may lead to the endorsement of other actors in processes of institutional change (Misangyi et al., 2008). Tangible resources can be used to motivate other actors to engage in collaborations which implement processes of institutional change. Institutional entrepreneurs can also leverage intangible resources in order to influence others and the rest of the field. These intangible resources can enable institutional entrepreneurs to lead collective action among a range of stakeholders (Maguire et al., 2004). In this way, institutional entrepreneurs present themselves as brokers who mediate on behalf of the mutual best interests of different groups (Fligstein, 1997), and control information flow to the participants of those groups (Burt, 1992).

Thirdly, discourses are another source of power. In the past, the importance of discourses was examined by Meyer and Rowan's studies of institutionalized myths (1977). Discourses form a boundary within which only certain actions are possible. Moreover, they can shape power relations whilst, conversely, power relations can shape discourses over time. In a historical and social context, discourses can structure collections of texts, and are associated with practices of textual production, transmission and consumption (Hardy & Phillips, 2004; Fairclough, 1992, 1995; Parker, 1992). In this way, institutional entrepreneurs should be able to have effective capabilities to construct appropriate meanings with which to develop power relations in processes of institutional change.

4.5.2. The Consequences of the Possession of Power for Institutional Entrepreneurship

Due to their central network position and the imbalance of resources, a powerful organization has a greater ability to win the attention of the media, and to motivate stakeholders and prospective organizations to engage in their projects in the field. The consequence of possessing power for institutional entrepreneurs, is that it gives them the ability to initiate collaboration and discursive activities.

Firstly, if they possess power, institutional entrepreneurs become able to achieve the goal of collective action by enabling themselves to function effectively (Gulati, Nohria, & Zaheer, 2000). Rather than controlling the perspective of an inter-organizational relationship (e.g., Pfeffer & Salancik, 1978), institutional entrepreneurs are more likely to use collaborations to manage the collective actions they perform which are associated with member organizations. Power can be used by one party over another as a way of maintaining stability within relationships (Inkpen & Beamish, 1997). Thus, a powerful organization may be able to establish rules which govern the responsibilities and obligations of members of collaborations. Institutional entrepreneurs also wish to establish groups associated with critical stakeholders in order to co-manage collaborations.

Secondly, powerful organizations can easily engage the attention of the media and the public. Powerful organizations are generally those that have existed within the field for a long time. They are aware of the kind of information that is required by the media and

the public. Institutional entrepreneurs can utilize their relevant experience of public relations to provide appropriate information to the media and the public. Additionally, because the actions of powerful organizations are the normal focus of related organizational fields, the media is more likely to pass on the information they present. Consequently, powerful actors in networks have a much higher reputation, status and dominant position than more peripheral actors (Deephouse & Suchman, 2008). When these organizations become institutional entrepreneurs, their power can be used to motivate collective action and utilize discursive activities.

4.6. The Legitimacy Issues in Institutional Entrepreneurship

Legitimacy can be viewed as an organizational or collective resource that firms acquire from their environments and that they subsequently use to meet established goals (Ashforth & Gibbs, 1990; DiMaggio, 1988; Durand & McGuire, 2005). Once organizations possess legitimacy, they have the right to act.

The definition of legitimacy in this study relies on that of Suchman: 'Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions' (Suchman, 1995: 571). Three general types of legitimacy have been identified: pragmatic/regulatory, cognitive and moral/normative (Scott, 1995; Suchman, 1995). Pragmatic/regulatory legitimacy is based on formal and informal institutions defining the rules and laws that provide the basis for stable societies (Scott, 1995). Moral/normative legitimacy 'reflects a positive normative evaluation of the organization and its activities' (Suchman, 1995: 579). Finally, cognitive legitimacy requires

collaborations or organizations to engage in actions that fall within the beliefs of society's cognitive structures.

Institutional entrepreneurs' actions and practices are embedded in the general system of society. Once they gain conformity, they have, to some extent, the basis of legitimacy. In an organizational field, legitimacy is predicated on an actor's understanding of, and conformity to, institutional rules. Especially in a time of economic recession like the present, the fundamental legitimacy of a high-tech product is based on value for money and technical performance. If they possess legitimacy, institutional entrepreneurs are capable, during standard wars, of institutionalizing standards in various ways. For this reason, I mainly focus on pragmatic legitimacy in my study of standard wars, rather than moral or cognitive legitimacy. This is because technical performance and the quality of specifications are the essential elements of new technologies. Particularly in an economic recession, greater technical performance and a more competitive price are the main factors that concern critical stakeholders, prospective organizations and customers, as these factors directly influence the willingness of these organizations to engage in production and purchasing behaviours.

Legitimacy stems from expectations which are placed on a focal firm or a group by stakeholders, nations or any other actors which have collective authority over what is acceptable (such as lawyers, accountants etc) (e.g. Suchman, 1995; Deephouse, 1996; Deephouse & Carter, 2005). These 'gatekeepers' are situated between institutional entrepreneurs and their own communities. They can decide which information should be passed to members of their communities. In order to diffuse the new institutions in the field, institutional entrepreneurs usually confront the challenges and questions of

these gatekeepers. In institutional entrepreneurship, although the conformity of an organization is the basis of legitimacy in institutional contexts, institutional entrepreneurs should have other methods of obtaining legitimacy. This study will identify other two methods: use of the media and inter-organizational relations.

4.6.1. The Sources of Legitimacy in Institutional Entrepreneurship

Firstly, media reports are extremely important indicators and sources of legitimacy for institutions (Baum & Powell, 1995). Deephouse (1996) suggested that media reports not only reflect but also influence the opinion of the general public (Fombrun & Shanley, 1990; McCombs & Shaw, 1972). Different media have different audiences. Deephouse and Suchman (2008) point out that prestige media figure prominently in studies of legitimacy. These prestige media have various ways in which they can broaden their influence. For instance, paper versions of newspapers are collected by libraries. Their presence in libraries makes them suitable for study by researchers in history, management and many other fields (Mezias & Boyle, 2005). Many other types of media will also quote from the reports and opinion pieces found in newspapers. In this way, the crossover between different media and different approaches broadens the legitimacy of prestige media.

Theoretically, the audience for prestige media is made up of societal elites who hold powerful or central positions in their particular fields. Prestige media are particularly likely to influence those sectors which they are seen as reaching. Therefore, prestige media are routinely targeted by organizations and institutional entrepreneurs who are seeking to build legitimacy. Furthermore, prestige media may tend to be conservative,

and intend to act as a stabilizing force in society. Once these media criticize actions of an organization which they dislike, they may hasten the de-legitimation of that organization (Gitlin, 1980).

Secondly, inter-organizational relations comprise another source of legitimacy. Sometimes, organizations become legitimate because they are connected to other legitimate organizations (Galaskiewicz, 1985). Governments and strategic alliances with prestigious partners have been identified as important sources of legitimacy (Deeds, Mang, & Frandsen, 2004; Higgins & Gulati, 2003, 2006). In the study by Singh, Tucker and House (1986), the amount of legitimacy possessed by a voluntary social service organization depended on whether it was listed in the community directory of metropolitan Toronto, which was registered as a bona fide charity with Revenue Canada. As this demonstrates, even when institutional entrepreneurs have been identified as legitimate players in their fields, they need to make connections with other legitimate organizations in order to seek greater legitimacy at the beginning of their institutional entrepreneurship.

4.6.2. The Consequences of the Possession of Legitimacy in Institutional Entrepreneurship

Institutional entrepreneurs are able to use legitimacy to obtain the resources they need and to further strengthen their legitimacy. Firstly, the accumulation of resources is an obvious benefit which can be gained after firms have gained legitimacy. If they possess legitimacy, institutional entrepreneurs can obtain resources from stakeholders who are willing to only exchange resources with legitimate organizations, and are not willing to

engage in transactions with less legitimate other organizations. Many studies have suggested that legitimacy influences market access: “An organization which can convince relevant publics that its competitors are not legitimate can eliminate some competition” (Pfeffer & Salancik, 1978: 194; see also Brown, 1994, 1998; Deephouse & Carter, 2005).

Secondly, when they possess legitimacy, institutional entrepreneurs are able to use discursive strategies to construct the meanings of new institutions (e.g., Green, 2004; Suddaby & Greenwood, 2005). As discussed in Chapter 2 and 3, institutional change is facilitated by the manipulation and reconceptualization of meanings (Miller, 1994; Orlikowski & Yates, 1994). The importance of discourse has been studied as a method of diffusing new practices in a given field (Nelson, Megill & McCloskey, 1987; Simon, 1989; Bazerman & Paradis, 1991, Zilber, 2006; 2007). For example, some studies use rhetorical analysis to understand the role of language in structuring social action (e.g. Suddaby & Greenwood, 2005; Zilber, 2007). This method adopts a socio-cognitive perspective on discourse, and assumes that institutional entrepreneurs make use of genres of speech and writing that reflect and manipulate the values and ideology of particular communities (Berkenkotter & Huckin, 1995). By using discursive strategies, institutional entrepreneurs can utilize symbolic management to acquire critical resources (Zott & Huy, 2007). Discourse conveys socially constructed meanings beyond its functional use and intrinsic content (Morgan, et al., 1983). In this way, institutional entrepreneurs can use discursive activities to convey the intrinsic and fundamental meanings of their new institutions (Amit, Brander, & Zott, 1998). Consequently, stakeholders may be willing to commit their resources to institutional entrepreneurs (Bhide, 2000; Schoonhoven & Romanelli, 2001).

4.7. The Collective Action Issue in Institutional Entrepreneurship

The process of collective action involves performing complicated tasks in order to achieve its goals. Group structure, commitment and communication are the three elements of collective action (e.g. Ostrom, 2000; Koehler & Koontz, 2008; Payan & Svensson, 2007). Group structure allows for the execution of effective actions to achieve stated aims. Commitment to collective action is a critical element in deciding whether these aims will be successfully achieved. Collective action engages participants in an intensive process of consensus building, which can lead to more creative solutions. Communication is a human activity that links people together and creates relationships. In this way, collective action is conceptualized as a set of communicative practices which take into consideration the engagement of, and interactions between organizations. This study will suggest that we can understand the collective actions of institutional entrepreneurs by observing their collaborative actions. Collaboration is the highest order of collective action, and is dependent on achieving a virtuous cycle of interaction, commitment and the achievement of outcomes, between the collective action and the outside community (Imperial, 2005).

In turn, the establishment of collaborations is critical. Collaborations can be defined as “cooperative, inter-organizational relationships which rely on neither market nor hierarchical mechanisms of control to ensure cooperation and coordination and, instead, are negotiated in ongoing, communicative processes” (Lotia & Hardy, 2008: 366). Collaborations can be viewed as professional associations in institutional entrepreneurship. The aim of such an association is to enact specifications of new

institutions and diffuse them into their particular field. In order to effectively manage the actions of member organizations in collaborations, institutional entrepreneurs need to establish a set of membership rules in order to assign and manage responsibilities and obligations. To summarize, if one studies the role of collaboration in institutional entrepreneurship, one can also demonstrate the role of collective action.

The rules and specifications of membership exert coercive, normative and mimetic pressures in order to strengthen isomorphic effects for the institutionalization of new practices (Lawrence, 1999). In order to do this, institutional entrepreneurs need to coordinate the different interests and opinions of members. When processes of institutional change are taking place, institutional entrepreneurs can sustain legitimacy and obtain resources through such interorganizational relationships. They can also promote their new practices or institutions, and collect feedback through the network connections of partners.

Studies of institutional change have investigated the importance of collective actions (Van de Ven & Hargrave, 2004; Hargrave & Van de Ven, 2006). Van de Ven and Hargrave (2004) suggest that collective action examines “the political opportunities structures and framing processes surrounding institutional arrangements, as well as the networks of distributed, partisan, and interdependent actors who become embedded in these collective processes” (p. 277). In order to achieve the goals of institutional projects, institutional entrepreneurs and partners increase their efforts toward collective action, and apply strategies to establish stable and secure sequences of interaction with other organizations to create new institutions (Aldrich & Fiol, 1994).

Collaboration has been used as a method of gaining legitimacy (Galaskiewicz, 1985); power (Agranoff & McGuire, 2001); and competitive advantages (Barney, 1991). This is because institutional environments need organizations and collaborations to conform to the prevailing social norms. Collaboration may confer legitimacy by providing a symbol of their conformity to institutions. By participating in collaborations, organizations can gain legitimacy by being members of reputable prestigious organizations. As a consequence, as a collaboration attracts more and more organizations, a positive spiral may be set in motion. This means that members of collaborations (including institutional entrepreneurs) can be further legitimated and empowered in institutional entrepreneurship.

Moreover, by establishing collaborations, organizations develop strategies to increase the effectiveness of their performance. Studies of social networks have indicated that collaborations characterised by a mixture of strong ties, which enable efficient and rich exchange, and weak ties, which enable greater exploration and flexibility, are likely to perform well (Uzzi, 1997; Rowley, Behrens & Krackhardt, 2000; Ozcan & Eisenhardt, 2009). This suggests that, by using both strong and weak ties, institutional entrepreneurs will have different modes of association with critical stakeholders and with other member organizations. In the next sections, I will elaborate upon the roles of membership rules in institutional entrepreneurship, and the ways in which specifications can be developed using collaborations. Furthermore, I will suggest that institutional entrepreneurs should have different modes of association and practices from those of critical stakeholders and other members of collaborations.

4.7.1. The Role of Membership Rules in Institutional Entrepreneurship

Membership rules can be central to the formation of networks of interested parties. Membership rules play three critical roles in institutional entrepreneurship: sharing and exchanging resources, professionalization and the maintenance of legitimacy. Firstly, in a well-established body of literature in inter-organizational studies, scholars have identified important relationships between resources, networks and competitive success in collaborations. Membership strategies delineate the exclusionary boundaries of members and the space in which members can operate. Within these boundaries, members can share and exchange resources with each other.

Secondly, according to DiMaggio and Powell (1983), professionalization is “the collective struggle of members of an occupation to define the conditions and methods of their work” (p. 152). In this way, professional associations are regulatory agents. When other organizations adopt the practices authorized by these professional associations, these practices generate an isomorphic effect in their particular field. In other words, these associations provide “isomorphic stability” (Greenwood, et al., 2002: 59). This demonstrates that professional associations play a role in compliance which is associated with normative and coercive expectations.

Thirdly, the establishment of inter-organizational relations is a method of maintaining and further achieving legitimacy in processes of institutional change. Institutional entrepreneurs may ally themselves with critical stakeholders in the beginning of a process of institutional change. In particular, when the allies consist of a large number of prestigious companies, they can offer legitimacy to other companies who are willing

to engage in the project (Doz, Olk & Ring, 2000). When collaboration is being mobilized, institutional entrepreneurs may continually select other leading companies to play important roles in the collaboration. Their engagement may enhance the quality of specifications and the legitimacy of promoted institutions.

4.7.2. The Role of Building Specifications in Institutional Entrepreneurship

The other critical element in collective action is the theorizing and diffusing of specifications. Theorization develops and elaborates the chains of cause and effect in new institutions. It simplifies and condenses the properties and characteristics of new institutions, and explains the outcomes they produce. In mature or highly professional settings, theorization plays a particularly important role. This is because boundaries and templates are well established and well structured in these settings (Lawrence, 1999). Without the strong development and elaboration of chains of cause and effect, new institutions are unlikely to be accepted by their audience (Powell, 1985; Abbott, 1988). This is because theorization also enables the formation and reproduction of shared understandings and meanings with audiences, such as the marketplace, other professions, stakeholders, nations and even professional associations themselves. (Ruef & Scott, 1998; Scott & Backman, 1990).

Diffusion occurs after theorization, and indicates the diffusion of new institutions to audiences in order to gain social consensus about their pragmatic value (Suchman, 1995); and increase their adoption in organizational fields (Kraatz, 1998; Palmer, Jennings & Zhou, 1993; Tolbert & Zucker, 1983; Westphal, Culati & Shortell, 1997). Diffusion occurs only if new practices or institutions are compellingly presented as

being more appropriate than existing ones. Strang and Meyer describe as follows: "Models must make the transition from theoretical formulation to social movement to institutional imperative" (1993: 495). Using discursive activities, institutional entrepreneurs can highlight the functional superiority of new practices or institutions. They can then diffuse them using mass communication media and interpersonal communication.

4.7.3. The Role of Having Stakeholders in Collaborations

If its member organizations include stakeholders who are centrally embedded within their industry network (Powell et al., 1996) as well as a range of other partners (Baum, et al., 2000), a collaboration can generate greater collaborative performance for institutional entrepreneurs. However, in practice, to establish strong ties, institutional entrepreneurs incur greater costs, including those of both tangible and intangible resources, than when they establish weak ties. Network research shows that when partners have greater trust (Sivades & Dwyer, 2000), communication (Larson, 1992), cooperation (Lorange & Roos, 1993), and coordination (Mohr & Spekman, 1994), they work together better and are more likely to obtain the benefits of ties. Thus, institutional entrepreneurs are more willing to choose partners who already have strong ties, and stakes, and who have experienced with ties in order to establish collaboration (Burt, 1992; Gulati, 1995, 1998; Rosenkopf, et al., 2001).

The rationale for this is that, at the beginning of an institutional entrepreneurship, things are very uncertain. According to resource dependence theory, institutional entrepreneurs are likely to form allies with experienced stakeholders in order to decrease the level of

uncertainty over resources (Dickson & Weaver, 1997; Eisenhardt & Schoonhoven, 1996). As a consequence, this study will suggest that institutional entrepreneurs not only need to establish membership rules, but also need to particularize their practices for the benefit of stakeholders.

Moreover, this study will also suggest that motivating stakeholders to engage in collaborations can be viewed as a strategy for impeding their rivals. Institutional entrepreneurs form particular relationships with critical stakeholders that define a unique and symbiotic interdependence. This is because this can increase the commitment of them, clarify their roles and bond their resources to institutional entrepreneurs. Once a new technology is accepted, these symbiotic members are able to earn considerable economic benefits, achieve financial success, and become more central and valuable players in their field. Institutional entrepreneurs and rivals tend to seek support from the same stakeholders. Using appropriate strategies to advocate new technologies to the same stakeholders can be seen as a competitive strategy in highly networked industries.

4.8. Discursive Activities

In institutional entrepreneurship, discursive activities play an important role in exchanging information and constructing meanings. If stakeholders and the public misunderstand information about the functions and characteristics of new innovations, institutional entrepreneurs will have to devote much effort to correcting these erroneous perceptions and interpretations. This type of situation may result from information asymmetry. Although institutional entrepreneurs and partners possess the correct

information, they cannot, or do not know how to, convey this correct information to their audience. As a result, this may cause adverse selection.

Discourses can display both symbolic and intrinsic dimensions (Lievens & Highhouse, 2003; Rafaeli & Vilnai-Yavetz, 2004). For example, if an institutional entrepreneur makes a speech at a prestigious conference to disseminate knowledge, this can be seen as information exchange. That entrepreneur is also conveying a message in order to establish meaning and to influence the perceptions of audiences, a process known as meaning construction.

4.8.1. The Information Communication in Institutional Entrepreneurship

In the beginning of an institutional entrepreneurship, institutional entrepreneurs need to make prospective organizations and stakeholders understand their actions and intentions. In order to avoid information asymmetry, institutional entrepreneurs must be able to attract the attention of the media and enable their journalists to report their new institutions correctly. Scholars have shown that chief executive officers (CEOs) can influence journalists and the content of those journalists' reports about corporate leaders and their firms (Westphal & Deephouse, 2011). Media reports can have a significant influence on the reputation and legitimacy of companies and can communicate information to their audience. Journalists can generate new knowledge about corporations by interpreting and assembling information from different sources and transmitting that information to stakeholders (Jensen & Meckling, 1998). Consequently, journalists can influence the perceptions of a wide range of stakeholders, including

customers, suppliers, public policy makers and the public itself (Deephouse, 2000; Graber, 2004; Fiss & Hirsch, 2005).

In practice, senior managers who work for the organizations of institutional entrepreneurs need to be able to influence the reports of journalists. Positive media coverage can enhance the power of new institutions (Hayward, Rindova, & Pollock, 2004). Conversely, negative media coverage can diminish their power (Wiesenfeld, Wurthmann, & Hambrick, 2008). This means that senior managers should develop ingratiatory forms of behaviour that will create social influence by invoking the norm of reciprocity from journalists. The norm of reciprocity is a nearly universal rule which governs social behaviour. When an individual receives a personal favor, he/she feels morally and socially obligated to return it (Cialdini & Goldstein, 2004).

4.8.2. The Construction of Meaning in Institutional Entrepreneurship

The construction of meaning is important in the creation and disruption of institutions. We can define the actions of institutional entrepreneurs as social expressions that can “incorporate both intrinsic and symbolic dimensions extend[ing] the view of a symbol as either a rhetorical device with little substantive action or as a socially legitimate verbal statement decoupled from any implementation” (Zott & Hoy, 2007: 72; Westphal & Zajac, 1998; Zbaracki, 1998). The intrinsic dimension is equivalent to objective or tangible functions, while the symbolic dimension refers to meanings that are evoked, because of which people make inferences about objects using shared interpretations.

Institutional entrepreneur's actions as well as objects can display both intrinsic and symbolic dimensions. For instance, institutional entrepreneur speaking in at prestigious conferences can be seen as an intrinsic way (disseminating knowledge) and also a symbolic way (conveying message then establishing people recognize his/her expertise). Defining an action as a social expression that we can extend the view of symbol as a socially legitimate verbal statement decoupled from any implementation (Westphal & Zajac, 1998). Consequently, in some extent, Zutt and Huy's study can be used to integrate the meaning construction and information communication.

Discourses can help social actors to frame social situations or to interpret ambiguous ones (Ashforth & Humphrey, 1997). In institutional entrepreneurship, it is not known if new institutions will be successful before they are fully developed and marketed (Gort & Klepper, 1982). Thus, institutional entrepreneurs should be responsible for constructing the meanings of new institutions clearly during the process of institutional entrepreneurship.

In practice, institutional entrepreneurs need to understand which kinds of information and which activities that construct meaning are appropriate for which recipient and which situation. For instance, in technological change, professional technological exhibitions or conferences are the critical places for the presentation of discourses. Each party can contact a wide range of professional media, companies from many relevant industries, buyers, and many other potential stakeholders in one and the same place. Different media have different audiences. The subscribers to professional media are normally their audiences. Deephouse (1996) pointed out that media reports not only reflect but also influence the opinions of the audience. Theoretically, therefore,

professional media often set the agenda for less professional media, and are routinely read by organizations in the relevant industries. Once institutional entrepreneurs seek to construct meanings, and to build or repair the legitimacy of new institutions, contacting these professional media should be prioritized. However, I would suggest that less professional media also have influence. Their audiences are less likely to work in professional or prestige organizations. However, institutional entrepreneurs can also present a less professional discourse in these media. They can also construct a general consensus which explains or diffuses a new technological standard to the population.

4.9. Conclusions

This chapter has suggested that institutional entrepreneurship can provide an integrative framework to explain standard wars. This study integrates the views of early institutionalists with organizational institutionalism to propose a main framework and to identify four attributes of institutional entrepreneurship: power, legitimacy, collective action and discourse activities.

Due to the network positions and social relations possessed by institutional entrepreneurs, these entrepreneurs have a certain degree of power and legitimacy at the beginning of processes of institutional change. This study suggests that power and legitimacy can be seen as resources which they possess. They can utilize these resources to motivate collective actions, establish collaborations and construct discursive activities. Chapter 4 also reinforced the views of stakeholders which were discussed in Chapter 2. Furthermore, this study suggests that institutional entrepreneurs should differentiate their practices for critical stakeholders and for other member organizations.

Institutional entrepreneurs should establish allies before establishing collaborations. The main tasks of an ally are to increase the commitment of critical stakeholders to new institutions and to act strategically to motivate more and more prospective organizations to engage in the collaboration.

However, the performance of collective action and discursive activities (three elements which I describe as ‘institutional entrepreneurship in standard wars’) contribute to the accumulation of power, legitimacy, network effects and product performance of new institutions – a stage I call ‘outcomes’. The issue of power and the accumulation of legitimacy is related to the number of members, the performance of R&D activities, and discursive activities. Firstly, as well as powerful and critical stakeholders, institutional entrepreneurs also need to motivate other prospective organizations to become member organizations. Secondly, researching and developing the technical specifications of new standards is the main task of collaboration in standard wars. If it has better specifications, the new standard can give a better performance. Thirdly, the more positive news reports there are about the institutional entrepreneur, the more their power and legitimacy are enhanced as well. In short, the resources of institutional entrepreneurs (i.e. power and legitimacy) have mutual relationships involving their collective actions and discursive activities.

The outcomes of establishing collaboration and constructing discursive activities are to produce a final product which is capable of responding to the requirements of critical stakeholders, and then convince them to produce an increasing number of complementary products, in order to create a larger number of network effects for the final products. In this way, product performance mediates the relationship between

‘institutional entrepreneurship in standard wars’ and network effects. Moreover, institutional entrepreneurs also promote their final product to consumers. When more and more consumers buy a specific product, network effects can also be generated.

So far, Chapters 2, 3, and 4 have described in depth the attributes of standard wars and of institutional entrepreneurship. This study argues that we can use this integrative conceptual framework to explain the main question and the three sub-research questions: how do firms defeat competitors in standard wars? How do institutional entrepreneurs sufficiently manage critical stakeholders, collective actions and discursive activities in processes of technological standard change? Chapter 5 will provide a new conceptual framework in figures. The chapter will also provide guidelines of each variable.

Chapter 5. Conceptual Framework

Figure 5.1 The Conceptual Framework

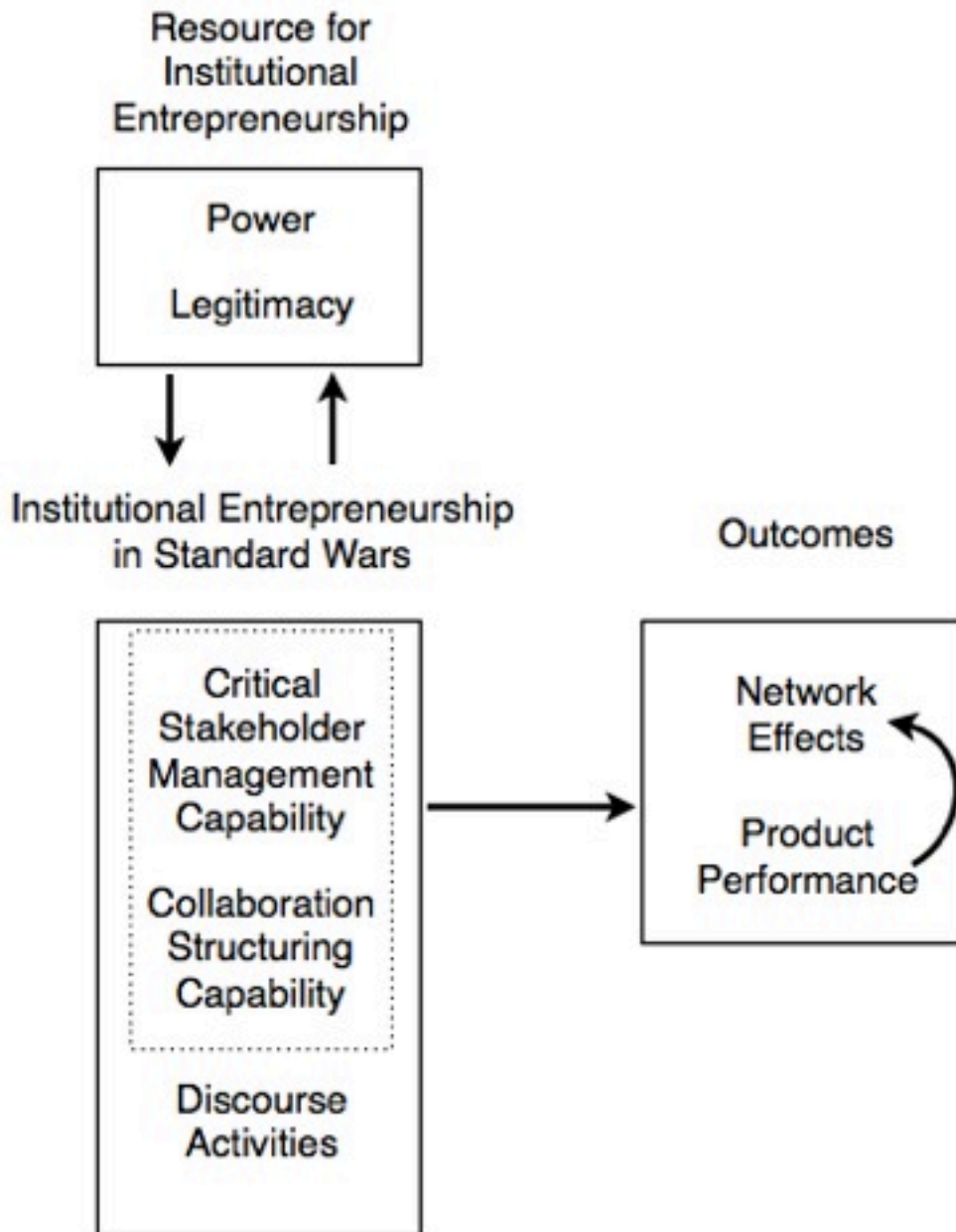


Figure 5.1 shows the conceptual framework of the study based on the literature review. Rather than discussing the antecedents of institutional entrepreneurship and the characteristics of institutional entrepreneurs, it focuses on the application of institutional entrepreneurship in standard wars.

The figure shows both critical stakeholder management and collaboration structuring capabilities in a dotted square. They represent the collective actions in this study. The study suggests that critical stakeholders and other member organizations are all members of the collaboration. The difference between them is that critical stakeholders play management roles in the collaboration, as they have critical stakes in institutional entrepreneurs. They have reputations in the relevant industries, and are also central organizations within the industries. In order to obtain the resources of these critical stakeholders, institutional entrepreneurs manage them using specialised practices. This study suggests that these practices can also be described as critical stakeholder management capability. Through these practices, critical stakeholders devise routines, procedures and structures that delineate who can legitimately make decisions within the collaboration or speak on behalf of it. In short, the critical stakeholder partners are symbiotic partners of the institutional entrepreneur.

In addition to critical stakeholder partners, institutional entrepreneurs also need a number of member organizations to promote the new standard throughout their network. I suggest that institutional entrepreneurs use collaboration structuring capability to manage these member organizations (which include critical stakeholders). This study views collective action as actions or behaviours of a group working toward common goals. The group's resources, knowledge and efforts are combined to reach these goals. Collective action is therefore seen as a generalized practice, rather than practices which are specific to the critical stakeholder.

The three elements of collective action are group structure, commitment and communication (e.g. Ostrom, 2000; Koehler & Koontz, 2008; Payan & Svensson, 2007). Group structure allows for the execution of effective actions in order to achieve the common goal. Commitment to collective action is a critical element when explaining whether the goal is achieved. It engages participants in an intensive process of consensus building which can lead to more creative solutions. Communication is a human activity that links people and creates relationships between them. As a result, collective action can be conceptualised as a set of communicative practices which take into consideration people's interactions and engagement. This study suggests that we can understand the collective actions of institutional entrepreneurs by observing actions within the collaboration. The collaboration is the highest order of collective action and is dependent on the achievement of a virtuous circle of interaction, commitment, and achieved outcomes between the collective action and the outside community (Imperial, 2005).

However, due to the limitations of data, it is impossible to directly observe the commitment of participants within the collaboration. It is also impossible to directly observe the content of their formal communication and the status of their informal communications within the collaboration. For these reasons, I only observe the frequency of formal communications within the collaboration.

The structure of Chapter 5 is as follows. Section 5.1 clarifies the relationships in the framework. This section has two aims. Firstly, it concludes the literature review begun in Chapters 2, 3 and 4. Secondly, it paves the way for Section 5.2, which makes operational the concepts included in the framework.

5.1. Clarifying the Relationships within the Framework

Two types of resources for institutional entrepreneurship are identified in Figure 5.1: power and legitimacy. These resources are produced when a firm has a central position in a network; such relationships will lead such focal firms to gain even more power and legitimacy within a given industry. Having central positions within networks means that institutional entrepreneurs can directly access other firms (both critical stakeholders and other organizations). Firms with previous good product performance will have more influence than firms in a given industry whose performance has been less good. Other firms will imitate the product if its performance is outstanding and dominant, in terms of its network effects and financial returns, among other factors. Hence, a firm with a dominant product will influence the development of new products in the industry. Moreover, many other organizations will establish relationships with the focal firms, such as buying relationships, alliances, co-development of R&D activities and so forth. Accordingly, focal firms with established relationships may more easily communicate influence and information to other organizations in their field. This view reflects the importance of degree centrality and betweenness discussed in Chapter 3. And these firms are easily to have power and legitimacy.

This study suggests that power is a relational phenomenon. Powerful focal firms can shape relationships and constrain the actions of other organizations. Power also enables institutional entrepreneurs to gain the attention of the media and its audience in order to promote their new standards and to motivate other companies to engage in their change

projects. The power of the institutional entrepreneur can be further accumulated as a result.

Similarly, their previous product performance in product lines relating to the new standards and to the relationships with other leading companies can be seen as important sources of legitimacy. This study focuses on pragmatic legitimacy. As a result of their experience of developing their previous products, institutional entrepreneurs provide evidence that they are able to produce the new standards. The performance convinces the audience that the new standards promoted by such firms are predictable and achievable. Legitimacy enables institutional entrepreneurs to obtain support from other players in the field who are only willing to invest resources in legitimate organizations, and are not willing to engage in transactions with other organizations. In addition, legitimate institutional entrepreneurs can more easily attract media attention, and then communicate information about new standards, and construct meanings for them, through media reports. It is more likely that the relevant professional media will report the actions of firms whose previous related products have performed well compared to those of other firms. Such media reports will influence the audience's perceptions. Thus, information about, and meanings of, the new standard will be further promoted to the audience. Moreover, relationships with leading legitimate companies provide institutional entrepreneurs with additional legitimacy (Galaskiewicz, 1985). Such relationships can be seen as a kind of endorsement of the actions of institutional entrepreneurs. This study suggests that, in addition, effective collective action and discursive activities will further enhance the legitimacy of institutional entrepreneurs.

This study identifies critical stakeholder management, collaboration structuring capabilities, and discursive activities as the crucial aspects of institutional entrepreneurship. Figure 5.1 indicates (by means of the dotted square around the two concepts) that critical stakeholder management and collaboration structuring capabilities should be bonded together as collective action. These concepts affect the outcomes (network effects and product performance) in separate ways. This study suggests that institutional entrepreneurs should develop specialised practices to manage critical stakeholders. This is because they have critical stakes. In this study, manufacturers of consumer electronic products and content providers which make complementary products all have critical stakes in the needs of institutional entrepreneurs. In standard wars, these stakeholders can help institutional entrepreneurs by means of cooperation in relation to research, the development of specifications and the enhancement of the network effects of the new standards. Hence, institutional entrepreneurs will establish alliances with critical stakeholders, and develop and manage forms of collaboration suited to the performance of their activities. Chapter 4 argues that institutional entrepreneurs can assign different responsibilities and obligations to member organizations of collaborations by using different types of membership. While collaborations with critical stakeholders require specialised management practices, institutional entrepreneurs will utilize generalised practices with other member organizations. Based on the specifications developed by allies, member organizations can further test the new standards, produce compliances, and initiate plans for promoting them to the audience. Although these are not critical stakeholders, power and legitimacy can be further accumulated by increasing the number of members of collaborations.

Discursive activities are important in different ways in the various stages of standard wars. At the beginning of a standard war, the audience has limited cognitive attention (Bizzell & Herzberg, 1990; Guthrie, 1993), and institutional entrepreneurs must use discursive activities to make them aware of the problems that may be solved by the new standard (Weick, 1979, 1995; Phillips et al., 2004). When institutional entrepreneurs have enabled actors to understand what is happening and which corrective changes will be made (Gephart, 1993), they should use discursive activities to promote the details of the change project and thus obtain legitimacy (Phillips et al., 2004). Later in the process, discursive activities are responsible for advertising the products made by the new standards. In general, the aim of discursive activities is to provide correct information and to construct meanings for new standards. Such meanings may include superior performance, better price and any evidence provided by institutional entrepreneurs and their critical stakeholders.

Finally, the outcomes of standard wars, network effects and product performance will result from effective critical stakeholder management, collective action and discursive activities. Because institutional entrepreneurs develop specifications of new standards and promote new standards to markets in collaboration with other firms, these outcomes are significantly influenced by collective action and discursive activities. Moreover, effective product performance will result in network effects. This is because effective product performance will lead customers to purchase products from a similar standard.

5.2. Data Themes which should be Collected

This section aims to provide observable themes for each variable. These will convey information in textual or descriptive form, which can include both statements of fact and statements of opinion. Such themes can show me the kind of information to collect. In the case study method, it is necessary to explain the data collection protocol in a systematic way. The data collection protocol is the procedure for using the conceptual framework in the data collection process. It includes a plan for monitoring the data as it is collected, to ensure high data quality. Thus, in the following sub-sections in Section 5.2, I will discuss the role of each variable in the study in systematic way then propose their themes.

5.2.1. Institutional Entrepreneurship in Standard Wars

The previous section argued that institutional entrepreneurship in standard wars is the heart of this study. It should therefore be prioritized.

The framework distinguishes between three aspects of institutional entrepreneurship: critical stakeholder management, collaboration structuring capabilities and discursive activities. These three aspects are derived from the literature review, and are the core concepts of this study. Clearly, any activity involved in collective action has discursive meanings. For example, when a focal firm provides simple information to its audience, this information has symbolic meanings. A prestigious office address could serve the intrinsic purpose of being a place where people work, but could also symbolically suggest prosperity and high status (Oldham & Rotchford, 1983).

To make a clear distinction between them, this study defines critical stakeholder management and collaboration structuring capabilities as activities which exclude the meanings of those actions which distinguish discursive activities. The aim of discursive activities is therefore to communicate information about, and construct meanings for standards and for the actions of institutional entrepreneurs and their partners. Thus, discursive activities communicate and construct not only the meaning of the standards themselves, but also the meaning of the collaborations, and thereby influence the perceptions of the audience.

5.2.1.1. Critical Stakeholder Management Capabilities

This study suggests that institutional entrepreneurs should use different practices for critical stakeholders than they do for other member organizations. Interactions between institutional entrepreneurs and critical stakeholders make up the core of institutional entrepreneurship. These interactions contribute to the establishment of achievable specifications of new technology, and the power and legitimacy of the institutional entrepreneur accumulates as a result. Institutional entrepreneurs are more likely to collaborate with critical stakeholders with whom they have existing relationships.

The aim of critical stakeholder management capability is to understand and respond to the expectations of such stakeholders throughout the process, to provide them with incentives for further cooperation, and to commit them to provide continual feedback. Although this study suggests that players with the required resources are more likely to become institutional entrepreneurs, they require more legitimacy and power in order to

influence their audiences. In this way, they initiate strong ties with critical stakeholders, and in particular with those who have leading positions in the relevant industries.

By interacting these critical stakeholders, institutional entrepreneurs respond to critical stakeholders' expectations what they assumed. At the same time, these stakeholders may express their expectations to institutional entrepreneurs. Institutional entrepreneurs should document how the actual performance of new standards has taken into account those stakeholders' concerns. This documentation can be seen as comprising declarations or assurances that institutional entrepreneurs will take a particular action or guarantees that a particular action will take place. Consequently, these critical stakeholders are more likely to engage in the camp and establish the specifications of the standard what the institutional entrepreneurs want. Hence, this study presents the following themes:

Theme 1. The specific responses of institutional entrepreneurs to the expectations and requirements of critical stakeholders.

Theme 2. The specific expectations about the new standard, as announced by critical stakeholders in media reports.

Theme 3. The specific performance of new standards, related to the expectations of critical stakeholders.

Theme 4. The actions of groups of critical stakeholders which establish the primary specifications of standards what the institutional entrepreneurs want.

5.2.1.2. Collaboration Structuring Capabilities

Efforts to successfully achieve the common interests of institutional entrepreneurs and their partners include their engagement in collaborations. In this context, we focus on the collaboration of many member organizations within a formal membership structure, with the aim of organizing the collaboration as a professional body. This can generate isomorphic effects in the field. In particular, as the number of members reaches a critical mass, having well-managed rules of membership not only helps institutional entrepreneurs to manage complex relationships, but also helps each collaboration to become a new ‘industrial section’. The term ‘industrial section’ refers to a sector, an area or portion of the relevant industry that is distinct from others. Within this new industrial section, while firms are embedded in the current institutional settings, they adopt new standards and specifications to produce new products (Van de Ven, Polley, Garud & Venkataraman, 1999). This group of companies then plays diverse roles in the transformation of a technological community into a commercially viable industry (Hargrave & Van de Ven, 2006).

As discussed in Chapter 4, I study collaborations as collective actions. Collaboration is a synergistic way of achieving outcomes (Imperial, 2005). The word ‘synergistic’ implies the capacity of the partnership to achieve synergy, i.e. the degree to which the total effect is greater than the sum of the individual effects. Moreover, collaborations have clear mission statements and defined perceptions of roles and responsibilities, and involve engagement in activities in order to achieve a specific purpose through formal arrangements (McGuire, 2006). Moreover, collaboration is generally achieved through a high level of communication between members. In collaborations, trust is increased and

this further increases the amount of communication of the information needed to achieve desired outcomes.

The membership structure refers to the collaboration's clear rules and objectives, and the provision of decision-making roles for collective action. Within processes of collective action, members have different opinions and interests, and so they need mechanisms to govern potential conflicts and coordinate divergent interests. Having a clear membership structure will allow their concerns to be presented to the mission (Astley & Van de Ven, 1983) and overcome the free rider problem (Olson, 1965).

Theme 1. The membership structure of a collaboration.

In order to maintain the membership structure, institutional entrepreneurs should present a mission statement to members and ensure good communication between members. The membership structure should be responsible for developing the technical specifications of new standards and many other activities in the standard war. Firstly, the mission statement refers to clear objectives which provide direction for the collective action. It should allow the different members to function as a unit, in order to attain their goals more easily (Astley & Van de Ven, 1983). Within the unit, members should prioritize clear goals, objectives, actions and timeframes that result in a more effective collective action, which will achieve their interests and goals (Astley & Van de Ven, 1983).

I cannot directly observe the quality and the amount of money invested in R&D activities in a particular standard war, and so I also cannot observe the commitment of

the participants within a collaboration. However, in a project of technological standard change, these goals, objectives, actions and timeframes relate to the R&D activities and promotion for the new standard. In particular, the R&D activities decide the product performance of the standard, and so not only the mission statements of the collaboration should be clearly defined, but also its R&D activities.

Theme 2. The mission statements of different member organizations in collaborations.

Theme 3. Collaborative R&D activities in relation to the specifications of the new standard.

Formal interaction and frequency of interaction are the two main aspects of communication. Formal interactions can be easily tracked and observed, when they do not use informal types of communication, such as email, voice message, telephone and face-to-face discussion,. Members of collaborations are more likely to discuss relevant issues and get official approval within such formal interactions. Frequency is another component of communication which affects collective action (Koontz & Bodine, 2008). Recurring communication reinforces trust among members who are confronting collective action dilemmas (Raymound, 2006), encourages members to take part in collective action (Imperial, 2005), and reduces the transaction costs of starting new memberships.

Theme 4. Formal communications between members in collaborations.

5.2.1.3. Discursive Activities

At the beginning of a standard war, an institutional entrepreneur must present the whole vision of the change project to its market. This stage uses framing processes. The aim of this stage is not only to provide compelling reasons which will capture its audience's attention, but also to shape a discourse battle with its competitors. The purpose of such a battle is to initiate a set of intensified competing discourses, which are likely to have negative performance consequences for the firm's competitors (Rindova, Bercera & Contardo, 2004). These competing discourses are intended to undermine the power and legitimacy of the existing standards and the competing alternatives. Moreover, institutional entrepreneurs simultaneously seek legitimacy for their new standard. By using these discursive activities, institutional entrepreneurs may obtain and enhance the legitimacy of the new standards:

Theme 1. The discursive activities directed to the audience which provide compelling reasons for adoption of the new standard.

Theme 2. The discursive activities directed to the audience which undermine its rivals and the existing standard.

Theme 3. The discursive activities which seek legitimacy of the new standard from the audience.

Following the initial framing stage, institutional entrepreneurs aim to further promote their new standard and to influence the audience's perceptions and interpretations. When an institutional entrepreneur with a strong base of power and legitimacy initiates a change project with a group of critical stakeholders, they can more easily catch the

audience's eye than can peripheral actors. However, if they cannot explain how the project fits the needs of critical stakeholders and of social interests (Green, 2004), the new project could easily lead to entropy (Zucker, 1988). Thus, they must demonstrate the performance of their primary products and answer the questions and criticisms of rivals and stakeholders. In particular, technological exhibitions and conferences are critical places to present such discourses. These occasions give each camp an opportunity to contact media, criticize rival's standards, respond and answer external groups' criticisms and questions.

At this stage, institutional entrepreneurs should ensure that their information and the meanings of the new standard and the relevant products are unified. They can then become reified and taken for granted (Phillips et al., 2004). In order to make such messages unambiguous, having spokespersons in standard war is critical. They can help the institutional entrepreneur to impose his desired agenda onto the media (Elsbach & Sutton, 1992; Staw, McKechnie & Puffer, 1983). Moreover, spokespersons can initiate multiple discursive activities (including responding criticisms and questions and promoting the new standards) to media in the exhibitions or elsewhere. Without unified information, the institutional entrepreneur may invest resources into fixing or repairing the confusion.

In the processes, institutional entrepreneurs use discursive activities promote the instrumental and symbolic meanings of the new standards. In general, institutional entrepreneurs aim at presenting that the product performance of the new standard is better than rivals and the specifications can satisfy the audience's interests. Hence, the institutional entrepreneurs can increase external groups' adoption and exclusive support.

In this vein, although the study can list several different discursive activities, their effects are connected with each other.

Theme 4. The discursive activities which respond to criticisms and questions proposed by competitors and audience.

Theme 5. The discursive activities which promote the new standard and its performance.

Theme 6. The discursive activities which are presented in professional exhibitions and conferences.

Theme 7. The discursive activities initiated by spokespersons.

5.2.2. Power

This study suggests that power and legitimacy are resources which can be proactively activated to initiate institutional entrepreneurship. Having power and legitimacy makes it possible for institutional entrepreneurs to gain effective outcomes and compete with rivals who propose alternatives in the field (Rindova et al., 2004). Mutual relationships exist between these resources and collective action and discursive activities. The next two sections discuss the guidelines of power and legitimacy.

As outlined in Chapter 4, institutional entrepreneurship contains both systemic and episodic power. Rather than focusing on the characteristics of the commodity of power, this study intends to focus on ‘soft power’. Power is a relational phenomenon and an

effect of social relations, something that has been discussed in Chapter 4. ‘Soft power’⁷ also refers to the ability to get what you want through attraction rather than through coercion (Nye, 2004). It is derived from illusion, the exploitation of the tendencies of others, and time (Santos & Eisenhardt, 2009). Firstly, illusion is the use of deception, such as exaggerating one’s importance to gain advantage and shielding intentions (Santos & Eisenhardt, 2009). Institutional entrepreneurs should present their experience of previous standard wars and their connections with critical stakeholders and professional associations. Such experience and networking, rather than exaggerations or deceptions, will make the audience believe that the institutional entrepreneur’s actions are genuine.

Secondly, rather than attempting to force others to act in a desired way, institutional entrepreneurs exploit the audience’s natural tendencies (Santos & Eisenhardt, 2009). By understanding the expectations of critical stakeholders and other member organizations, institutional entrepreneurs can better target their requirements, respond to their expectations and successfully persuade them to engage in their change projects. In standard wars, not only institutional entrepreneurs themselves but also critical partners are viewed as conduits to an understanding of the tendencies of dynamic markets and customers. Moreover, within professional associations related to the new standards, institutional entrepreneurs can also show that they understand the market’s tendencies.

⁷ By using the concept of soft power does not conflict with the discussion of power issue in Chapter 4. According to the latest study of Lawrence, Malhorta, and Morris (2012), systemic power is able to “institutionalize radical change when the systems associated with it are legitimated by the skilled use of language by key actors and then left to operate independently by those actors.” (p. 102) Episodic power is able to “initiate and energize radical change when it represents a significant break from traditional authority structures and is legitimated through appeals to traditional organizational values.” (p. 102) Based on the discussion, by using soft power, institutional entrepreneurs can use discursive activities to establish systemic power and use collaboration to theorize and legitimize the specifications of new institutions.

Finally, institutional entrepreneurs need time to cement their actions in the audience's mind. It takes time to successfully change people's perceptions. We can imagine, that feeding the audience with information about the new standard is a kind of "brainwashing". It is difficult to immediately convince the audience to accept a particular new product. They need time to change their minds, so institutional entrepreneurs should provide them with detailed information about the standard war (Nisbett & Ross, 1980; Rindova, Pollock & Hayward, 2006).

In a sense, the concept of soft power is similar to the additional insight provided by Steven Lukes's three-dimensional view of power (Lukes, 1974). Rather than one- and two-dimensional views focusing on observable conflicts, the third dimension focuses on not only observable but also latent conflicts. A can "exercise power over actor B by influencing, shaping, or determining his wants and preferences" (Lorenzi, 2006: 91). In other words, A makes B believe that the superiority of things produced by A is taken-for-granted. Thus, by using soft power, A makes B believe that A has experience and knowledge required for the new institution. By feeding the relevant information in a long run, B will eventually believe that A can do it.

Using soft power to collect the relevant information, I will study the relationships between institutional entrepreneurs and critical stakeholders, as well as their experience of initiating and/or taking part in previous standard wars which relate to the current one. They are familiar with the practices and routines within existing institutional environments and standard wars.

Moreover, I will also collect the continuous R&D activities of institutional entrepreneurs in collaboration with critical stakeholders and other prospective organizations which relate to the specifications of the new standard. The continuity of institutional entrepreneurs' R&D activities can be seen as their episodic power in standard wars. Having more R&D activities which relate to the new standards shows that institutional entrepreneurs have an understanding of the latest developments concerning the new standard. Moreover, looking at institutional entrepreneurs' R&D collaborations with critical stakeholders and/or prospective organizations presents the audience with a space of illusion. This means that institutional entrepreneurs and critical stakeholders are not only capable of tracing the latest technologies relating to the new standard but also are capable of understanding the needs and wishes of the audience (and of prospective organizations) concerning the new standard.

Theme 1. The number of patents relating to the new standard developed by institutional entrepreneurs

Theme 2. The number of patents per year related to the new standard produced in collaboration by institutional entrepreneurs, critical stakeholders, and prospective organizations during the standard war.

The main difference between the first and second themes is that the latter focuses on describing the process of R&D activities in the collaboration, while the former focuses on the number of patents related to the new standards. In other words, it presents the outcomes of collaborations between institutional entrepreneurs, critical stakeholders and prospective organizations.

If a company has won a previous standard war, it has a creditable record which it can present to the audience in the new standard war. When a firm has lost a previous standard war, however, this does not mean that the firm has no chance of winning the next war. On the contrary, it means that the firm has valuable experience and may be ready to apply this experience to the next war. This is what the Chinese mean by the saying 'failure is the mother of success'.

Theme 3. Institutional entrepreneurs' experience of previous standard wars.

5.2.3. Legitimacy

Like power, legitimacy also has mutual relationships with the behaviour of institutional entrepreneurs in standard wars. As discussed in Chapter 4, this study focuses mainly on pragmatic legitimacy in processes of technological standard change. This study defines critical stakeholders as institutional entrepreneurs' symbiotic partners. Therefore, one should consider not only the institutional entrepreneur's pragmatic legitimacy but also that of their critical stakeholder partners.

Pragmatic legitimacy relates to the instrumental value of the institutional entrepreneur and its critical stakeholder. It represents what they are seen to be able to do in order to serve the needs and interests of their audiences, and includes the previous product performance of institutional entrepreneurs and their critical stakeholder which relates to the standard war. They provide evidence to show that they can improve the economic interests of other organizations.

Theme 1. The previous product relevant performance of critical stakeholder.

The rationale of this is that institutional entrepreneurs co-research and co-develop the specifications of new standards with their critical stakeholder. For this reason, the product performance of these critical stakeholders should be taken into account. Thus, if they have greater product performance in their relevant segments and higher productivity in the standard war, critical stakeholder are able to influence the perceptions of their audiences in the standard war.

Theme 2. The previous performance of the institutional entrepreneur's star products.

Outstanding product performance in product areas relevant to the new standard indicates to the audience that the intentions of the institutional entrepreneur are achievable and predictable. As a result, the endeavors of the focal firms are appreciated (Scott, 1991; Wuthnow, Hunter, Bergesen & Kurzweil, 1984), something which will further enhance the legitimacy of the focal firm.

Theme 3. The business segments relevant to institutional entrepreneurs and their critical stakeholders.

Institutional entrepreneurs and critical stakeholders may have star products and outstanding products which are not related to the new standard. Because of this, they may not be able to show that they have technical legitimacy in relation to the new standard. The main products or services of an organization are normally those that give it the largest economic returns. These products and/or services will be described as the

main business segments of that organization. When the business segments of an institutional entrepreneur and a critical stakeholder are evaluated highly in relation to a specific standard, and when they support this standard, the audience may be less likely to raise questions about the standard's technical quality.

5.2.4. Outcomes

The framework includes two types of outcomes: network effects and product performance. In standard wars, these outcomes can help the market and other firms to evaluate whether the standard is worth supporting. In some cases, the defeated standards may co-exist in the market with the winning standards. However, the market share of the defeated one will be too small to generate network effects. For example, in the VHS vs. Betamax war, by 1985, Sony had begun to scale back production of Betamax recorders. However, the format still survived among professionals for some time afterwards. In such a situation, we can say that the standard war has been won by the firm with the larger market share and greater network effects.

Network effects occur when the value of a product or service to a consumer is contingent on the number of other people using it (Farrell & Saloner, 1985, 1986; Katz & Shapiro, 1986, 1994). Quantity is critical for measuring network effects of a standard war. It includes installed base of a particular products, sales units, and complementary goods of the standard. It is important for measuring the installed based of the new standard. However, it is critical to measuring the installed base of previous version of the product when the new standard provides backward compatibility.

This study will look in particular at the number of products and complementary products in the market per month associated with particular standards. It will help it to show whether the network effects of a particular standard are influenced by particular events, collective actions and discursive activities.

Theme 1. The number of installed bases in a particular product (produced by the new standard and/or the previous version) before and during the standard war.

Theme 2. The monthly sales (units) of a product produced by a particular standard during the standard war.

Theme 3. The number of complementary goods in the market per month associated with a particular standard during the standard war.

Finally, there are many measures of product performance which focus on different levels and dimensions (Molina-Castillo & Munuera-Aleman, 2009). This study suggests that technical and price performance are proper measurements of product performance (Talke, 2007). Financial performance indicates how much revenue is earned by the institutional entrepreneur in the standard war. However, the focus of this study is on how institutional entrepreneurs maneuver strategies in processes of technological standard change. It is a process-oriented study, and so, financial performance is not appropriate for it. On the other hand, the technical performance of technological products is highly relevant to customer satisfaction (Huang, Soutar, & Brown, 2004), and so this study will suggest that technical performance is the proper guideline of the performance of the product.

In addition to technical performance, this study also suggests that price performance should be taken into account. Although technical performance is defined by institutional entrepreneurs and their critical stakeholders for their customers, if the customer does not ascribe good or high value to the product, the product will find it difficult to defeat its competitors.

Customers often measure a company's ratio of outcomes to inputs by making comparisons. They constantly compare it with its competitors' offerings. This is not only true of the technical performance of the product, but also of its price. For example, Cusumano et al. (1992) suggest that price, capacity, and sound and display are the proper guidelines of the performance of the product. In the digital era, I would further suggest that compatibility and copyright protection should be taken into account when assessing a process of technological change. This study should therefore collect several dimensions of product performance:

Theme 1. Capacity

Theme 2. Compatibility

Theme 3. Quality of sound and display

Theme 4. Copyright protection

Theme 5. Price

Chapter 6. Research Methodology

By following Eisenhardt's (1989) principles and open coding techniques of grounded theory⁸, I use an critical case-study method within a theory-driven approach to study this intrinsic case, to answer the research questions, and to construct a new theory which will explain how firms defeat competitors in standard wars (cf. Yin, 1994). The study aims to find a causal relationship between ideas. In the literature review, I cover a wide range of perspectives concerning standard wars. The review also identifies several gaps in existing studies of standard wars. However, these perspectives do not constitute an integrated viewpoint when answering the research questions. It is my aim to provide such an integrated approach by focusing on institutional entrepreneurship, in an attempt to outline the relationships between distinct variables.

Traditionally, all social science methods are tested by internal, external validity and reliability (Kidder & Judd, 1986, Yin, 1994). Rather, qualitative studies tend to use different criteria (Gill et al., 2010) (e.g., credibility, dependability, and transferability). Some scholars claim that case study is an inferior sort of scientific method. On the contrary, the study is possibly the basic method of science (Holland & Herstad, 2000). However, without generalization, we could not interact with our findings in a coherent manner.

⁸ The study adopts open coding exclusively. It is the one of analyzing techniques of grounded theory. Grounded theory adopts the interpretivist assumption in social science. It enables researcher to seek out and conceptualize the latent patterns and structures of researcher's interest through the constant comparison. In contrast, content analysis is the one of multiple contexts for acquiring data. It is a methodology in the social science for word counting. Although the method is a summing, quantitative analysis of messages that relies on the scientific method, it is somewhat more problematic in that it bears positivist assumptions about the relationship between meaning and word frequency (Suddaby, 2006). In some extent, adopting content analysis may violate the interpretivist assumptions of grounded theory (Krippendorff, 2003).

This study adopts the idea of naturalistic generalization, advocated by Robert Stake (1982). The idea advocates a realignment of the responsibility to generalize away from the researcher toward the reader. In order to respond the generalization issue, this study will briefly discuss the criteria of transferability in the beginning of this chapter. The study will further discuss the evaluations in the following paragraphs.

The criteria of transferability is meant to make possible naturalistic generalization, which invites readers to apply ideas from the natural and in-depth depictions presented in case studies to other specific contexts. The process of naturalistic generalization of findings from research involves a transfer of knowledge from one study to another cases based on in-depth knowledge of the specifics of the studied case. In order to make possible naturalistic generalization of findings from my research, I have to provide a high degree of detail and thick description of the case. This should make the readers aware of the differences between the studied case and other cases and, accordingly, facilitate transfer of knowledge to the extent that it is relevant..

Lincoln and Guba (1985) propose that a qualitative inquiry should demonstrate trustworthiness, as opposed to the conventional experimental precedent of attempting to show validity and reliability. The aim of trustworthiness (credibility, dependability and transferability) is to support the argument that the findings of a qualitative study are “worth paying attention to” (Lincoln & Guba, 1985: 290). In general, the evaluation of a qualitative study is based on thick description. Having thick description, I can use different data sources to triangulate a finding. In a sense, the systematic errors could be minimized, including researcher idiosyncrasies and the findings may be transferred to other similar contexts.

According to Gill and his colleagues' (Gill et al., 2010) general principles, credibility, transferability, and dependability, first, internal validity is replaced by credibility. The key idea is primarily established by 'member checks'. By feeding back to those members who are accounted for my study, they can help me to check out whether or not the findings are correct. However, the findings are mainly based on media reports. Lots of people working in Toshiba and media do not respond my requirements on interview. Although the study conducts few interviews, it is impossible for responding the criterion of credibility. Instead, this study uses many data sources to triangulate the findings. By using triangulation and thick description, the study can accurately represent the case's subjective dispositions.

Second, reliability is replaced by dependability. The criterion is met through the provision of the audit trails. It involves documentation of all stages of the study and the choices made by the researcher. In order to respond the criterion, I present the documentation of the open coding procedures of this study in Chapter 7. I also detail the evidence that is knitted to verify the conceptual framework and produce the new findings in Chapter 7. In a sense, this documentation enables other researchers to reconstruct the processes in other contexts.

Finally, the most important feature of building a theory using a case study is its transferability (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). It replaces external validity. The key is to "provide other researchers with a database which allows them to judge the extent to which the findings are transferable to other social settings with which they are familiar" (Gill et al., 2010: 228) by producing in-depth accounts of the

setting of this study. In order to live up to the criterion, I detail the information and evidence as necessary as I can in Chapter 7. Based on enough thick description, I can provide a reasoned judgement about the degree of transferability.

In order to achieve transferability, I have adopted Eisenhardt's principles, published in the *Academy of Management Review* in 1989, as my guidelines for building a theory using case-study research. Although Eisenhardt presents multi-case studies (e.g. Davis & Eisenhardt, 2011; Ozcan & Eisenhardt, 2009; Santos & Eisenhardt, 2009), her principles also outline critical rules for conducting explanatory case studies involving single cases. For this reason, I will adopt most of her principles in this study. This is discussed in full in Section 6.1.

I have chosen the standard war between Sony Blu-ray Disc (BD) and Toshiba HD DVD as my critical case (Flyvbjerg, 2006). In general, critical case can be defined as having strategic importance in relation to the general problem. The concept was introduced by Flyvbjerg in 1991. Selecting critical case provides the possibility to formulate a type of generalization. Because, the generalization would be, "If this is (not) valid for this case, then it applies to all (no) cases" (Flyvbjerg, 2006: 230). In a way, the chosen technologies are pretty mature in the field. The chosen case was happened in a mature field where the relevant actors are well-converged and the institutional logic(s) are settled down. If the institutional perspective can be verified in the case, the findings can be naturally generalized to other similar context, either mature or emerging fields. The uniqueness of case represents a critical and intrinsically interesting case rather than representative case.

As argued in Chapter 1, the fact that the studied standard war is in a mature technological field with a more or less established institutional set-up makes it a critical case. It is critical in the sense that it represents a 'least likely' case in relation to showing the importance of institutional entrepreneurs and an institutional perspective for understanding the process and outcome of the standard war relative to a functionalist approach. This is premised by the view that even if the case involves competing institutional logics it is a well-established institutional field with well-converged actors which means that you would presume that there is much less space for institutional entrepreneurship than in emerging fields. It can be expected that the outcome of such a standard war can be well understood by a functionalist approach. It is a mature technological field and the standard can be expected to have relatively limited duration as the functions of optical storage may be replaced by cloud computing in the not too distant future. The relevant organizations and customers also have experienced several similar standard wars in the not too distant past, such as the wars around the standards for VHS, CD, VCD, and DVD. Based on this experience, Sony or Toshiba understand pretty well the expectations of the stakeholders and the rules of the game. Compared with standard wars in emerging fields, the BD-HD DVD case happened in a very mature field. The characteristic of maturity presents the uniqueness of the case. Thus, if institutional entrepreneurship and the institutionalist perspective is crucial in order to understand this case it can be concluded that it is also crucial, and probably even more so, in other standard wars. However, the exact way in which an institutionalist approach is crucial may of course be much different in other standard wars. However, by using naturalistic generalization, the findings of this case may be generalized to other similar standard wars, either happening in a mature or emerging field.

The BD-HD DVD standard war can also be seen as an intrinsically interesting case. It can be seen as an intrinsic case because of the unique maturity of the case which makes it interesting in itself because other standard wars typically concern radical innovation and emerging fields. Stake (1997) suggests that an intrinsic case study is often exploratory in nature. Rather than extending theory or generalizing across cases, the researchers are more likely to explore the intrinsic case as the aim itself. However, the studied case also has the characteristic of critical case, because “if this is (not) valid for this case, then it applies to all (no) cases” (Flyvbjerg, 2006: 230). Furthermore, by providing a thick description of the case, my case and findings can give other readers the means necessary for adapting the conclusions from my study to other studies of standard wars. Consequently, I believe that the BD case is different from other standard war studies. Its own uniqueness, the degree of maturity of the technology and the field, presents that it is both a critical and an intrinsically interesting case.

This study borrows the technique of open coding to analyze the data. There are various ways of analyzing case studies, including quantitative and qualitative methods (Byrne & Ragin, 2009). The main advantage of analysing the BD vs. HD DVD case qualitatively is that such a method can generate a theory whose causal relationships are appropriate for the context. Many of the relevant empirical studies of institutional change contain interesting findings which concern discursive activities (e.g. Brown, Ainsworth & Grant, 2012; Castel & Friedberg, 2010; Munir & Phillips, 2005; Suddaby & Greenwood, 2005). To summarize, these empirical studies conclude that neither cognitive aspects nor discursive activities should be ignored when studying processes of institutional change. Altering the perceptions and behaviors of the audience is required

if their existing myths are to be successfully challenged. When this has been achieved, institutional entrepreneurs need to establish new myths about their new institutions.

There is no well-accepted method of analysing an explanatory case study. Eisenhardt's principles (1989) simply propose a few essential practices for the analysis of data. She has employed these principles to publish many empirical studies in a range of first-tier academic journals, including the *Academy of Management Journal* (Hallen & Eisenhardt, 2012; Ozcan & Eisenhardt, 2009; Santos & Eisenhardt, 2009) and *Administrative Science Quarterly* (Davis & Eisenhardt, 2011). This demonstrates that her principles have been accepted as part of management science and the study of organizations.

In order to achieve the criteria of transferability, credibility and dependability in qualitative studies, this study borrows open coding procedures. Using these procedures does not contradict Eisenhardt's principles. She states that 'I have drawn upon the ideas of theoretical sampling, theoretical saturation, and overlapped coding, data collection, and analysis from Glaser and Strauss (1967)' (1989:545-546). However, her principles are distinct from grounded theory in various important ways. For example, they focus on building theory from cases, and the methods that can be used to achieve this. This means that Eisenhardt's work is the culmination of earlier work, which, together with empirical studies, can assist us in defining research questions and shaping the initial design of theory-building research.

Section 6.2 will therefore introduce the use of Eisenhardt's principles in the analysis of case studies. I have chosen four articles published by Eisenhardt and her colleagues in

the *Academy of Management Journal* and *Administrative Science Quarterly* between 2009 and 2012, and I will show how these articles use her principles. I will also compare them with my study and show how I use these principles to analyse my data. Section 6.3 shows how I used theoretical sampling to choose the standard war between BD and HD DVD as my case study. Section 6.4 discusses the data sources, and includes a synoptic table showing each guideline and its corresponding data sources. Finally, Section 6.5 discusses the process of data analysis using the analytical techniques of grounded theory.

6.1. The Case Study Method and Eisenhardt's Principles

The case study method can describe, explore and explain phenomena within particular contexts by using a variety of data sources. Rather than using one viewpoint, the case study method uses a variety of viewpoints which allow for several different aspects of the phenomenon concerned to be revealed and understood.

According to Yin (1994), case studies can be explanatory, exploratory or descriptive. Rather than aiming to describe a phenomenon in its real-life context, or to explore situations in which the influences being evaluated are not clearly linked to outcomes, explanatory case studies aim to elaborate causal relationships between constructs in the relevant setting. However, while quantitative explanatory studies only focus on a small number of variables, and only provide a thin description of the phenomena being studied, explanatory case studies can be complemented by thick description in order to give an account which is appropriate in terms of relevant characteristics, qualities and events. In order to conform to the criterion of transferability, case study researchers

must collect a sufficient amount of accurate data from various sources, including interviews, archives, observations and even questionnaires. This data provides the basis of thick descriptions and triangulations (Holliday, 2002; Denzin, 2003; Hammersley, Gomm & Foster, 2000). A thick description requires researchers to describe the case being studied in detail, while triangulation provides researchers with opportunities to discover new ideas or constructs which have previously not been seen or been ignored. Using several different data collection methods, triangulation substantiates the constructs and findings. In this way, a researcher using the explanatory case study method should set out to collect a considerable amount of data, in order to triangulate the analysis and provide a thick description of the phenomenon being studied.

Eisenhardt (1989) developed a model for building theories from case studies, in which her principles outline the procedure to be followed. With a few exceptions, I follow these principles when using my single case study. (I have, however, been following her principles from the beginning of this thesis, when defining my research questions.) I present Eisenhardt's principles below, and outline the ways in which I have applied them. In the body of Eisenhardt and her colleagues' publications, they build or extend theories by using multiple case studies. The essential difference between their studies and mine is that their cases are representative whereas my BD case study is intrinsic and critical. However, this study is still a case study. Although the case cannot be representative, the case can further extend our understanding about standard wars because it is critical and intrinsic. Consequently, Eisenhardt's principles are seen as applicable also in this study and will be used to ensure the quality of the findings of the case.

Firstly, it is important to define the research question, in order to determine the boundaries and focus of the study. According to Eisenhardt (1989), if studies do not have a clear research focus, they can easily become overwhelmed by the sheer volume of data. The focus of this study has been developed through a review of existing theoretical works concerning the attributes of standard wars and institutional entrepreneurship, together with the connections between them. This is a means of clarifying the research questions as well as guiding analysis of them.

Secondly, Eisenhardt (1989) suggests using ‘theoretical sampling’ when selecting the case study. In short, ‘theoretical sampling simply means that cases are selected because they are particularly suitable for illuminating and extending relationships and logic among constructs’ (Eisenhardt & Graebner, 2007: 27). In a quantitative study, the choice of an appropriate sample makes it possible to generalise its findings. In the case-study method, the case is chosen for theoretical rather than statistical reasons (Glaser & Strauss, 1967). Rather than obtaining accurate statistical evidence about the distribution of variables within the population by means of statistical sampling, theoretical sampling may be chosen in order to replicate previous cases, or to fill theoretical categories and provide examples of particular types (Eisenhardt, 1989).

This study aims to develop a new theory in order to explain how standard wars can be won using institutional entrepreneurship. This section will explain in more detail how I used theoretical sampling to choose my single case study, the standard war between Sony Blu-ray Disc and Toshiba HD DVD. In general, using the data which was available to me, this case study reflects the attributes which are usually discussed in studies of standard wars and institutional entrepreneurship. Section 6.2 will discuss the

reasons for this in detail. Using a single case study requires careful investigation of the case and that misinterpretation of the data should be minimized. Using theoretical sampling allowed me to predict where and how I could find the data I needed to fill gaps and to fully satisfy each category. In short, using this technique ensured that I constructed full and robust categories, and led me to clarify the relationships between different categories.

Thirdly, Eisenhardt (1989) also emphasises the importance of using a variety of data sources in case studies. Case study research utilizes both qualitative and quantitative data (Yin, 1984), while multiple data sources provide the basis for thick description and triangulation. It is important for the researcher to have sufficient material to enable him to illustrate and develop the categories identified in his conceptual framework. Before undertaking my data analysis, I surveyed the available data, and also collected data from websites, interviews and the databases of the focal firms and their main collaborators. The media reports I used are from different kinds of publication. This dataset provided me with information about business strategies and analyses, product reviews, company history, market sales figures, and details of the actions of both camps and the reactions of the news media, among other things.

The data sources used in this study are different from those used in the majority of studies that apply open coding. Traditionally, participant observations and interviews have been seen as the primary data sources. Moreover, the barriers of language and culture encountered in Japan make traditional observation and interviewing very difficult, so analysing media reports is an alternative way of exploring the context. Media reports, websites and so on provide most of the data. However, they are

complements by interviews with a Japanese informant and with journalists. The aim of these interviews is to triangulate the findings from the media reports and to saturate the data collection.

Moreover, during the data collection stage, it is important for the researcher to make notes of any impressions which occur during the process of data collection, as good notes stimulate the researcher to develop further questions. The ideas that emerge from them will shape his future actions, areas he can investigate and questions he can pose when analysing the data.

Fourthly, Eisenhardt recommends 'analysing within-case data', as well as 'searching for cross-case patterns'. This study adopts the principle of 'analysing within-case data', but identification of cross-case patterns is not relevant in this single-case study. Eisenhardt suggests a very flexible strategy for analysing within-case data. In general, the aim of this stage is to gain familiarity with the data and to generate a preliminary theory. A useful starting point is to construct an array or display of the data. A display is a visual format, which presents information systematically so that valid conclusions can be drawn from it. Once the display has been constructed, the researcher should begin to look for explanations and causal links. Following Miles and Huberman (1994), I used a 'causal network' to search for explanations and causality within my single case. A causal network is a 'display of the most important independent and dependent variables in a field study and of the relationships among them' (Miles & Huberman, 1994:153). The technique is associated with analytical texts which describe the meaning of the connections between factors.

At this point, the researcher should strive for coherence and correspondence in single-case studies (Denzin & Lincoln, 2003). Coherence is produced if the different parts of the arguments fit with each other, and also fit the data and the emergent theory. Eisenhardt (1989) suggests that even if such notes are only descriptions, they can still lead to important insights. They also make it possible for the researcher to cope with the volume of data collected early in the analysis process, which is often enormous. If coherence and correspondence are achieved, researcher idiosyncrasies can be minimized and authentic representations of the research settings under investigation can be produced.

Fifthly, Eisenhardt proposes the principle of ‘shaping hypotheses’. This study aims to generate hypotheses concerning causal relationships. To do this, Eisenhardt suggests a two-step process. The first step is to refine the definition of the construct, and to build evidence which measures it within the case. This is done through constant comparison between the constructs and the data, and means that the researcher produces a well-defined construct by accumulating evidence from diverse sources. The second step is to verify the relationships which emerge between the constructs and the evidence in each case. Following a logic of replication, these relationships, when confirmed, increase confidence in the validity of the relationships.

Sixthly, Eisenhardt proposes ‘enfolding literature’. In this stage, the emergent constructs, theories and relationships are compared with the extant literature. The rationale is to ask ‘what is this similar to, what does it contradict, and why?’ (Eisenhardt, 1989:544). If the researcher ignores conflicting findings, confidence in the findings is reduced. More importantly, instances of divergence from the literature

will present future research opportunities. To some extent, comparison with the literature will lead to collection and analysis of further evidence, data or even additional case studies. The process of including further data should progress until ‘theoretical saturation’ (Glaser and Strauss, 1967) is achieved. This is when the marginal value of the new data is minimal. Following this principle, I will compare and contrast my findings with the extant literature in Chapter 8.

Seventhly, according to Eisenhardt, the final stage is ‘reaching closure’. This is when the process of iterating between theory and data is ended. Compared to multi-case studies, a single-case study will have a clearer boundary in this respect. This aim of this thesis is to study the standard war between BD and HD DVD, so the boundary of the case is the actions and strategies of both Toshiba and Sony from 2002 to 2008.

In this section, I have outlined the rigorous principles of the single-case study method proposed by Eisenhardt. Eisenhardt’s principles are useful for junior researchers when designing an appropriate procedure of study. In this research, I have followed her principles in the design of a practical case-study procedure (except in the areas of cross-case pattern searching and the shaping of my hypothesis).

6.2. Using Eisenhardt’s Principles to Analyze a Case Study

Since 2009, Eisenhardt and her colleagues have published several management and organization studies in the *Academy of Management Journal* and *Administrative Science Quarterly*, all of which use her principles. These articles include a review of existing studies which are relevant to the specific topic. In order to describe the

practices clearly, this section will take one of these articles as an example, and demonstrate the process by which Eisenhardt uses her principles to establish and address a research question. It will then make a comparison between my study and other studies by Eisenhardt and show the similarities between them. I believe that these similarities will further strengthen the legitimacy of the ways in which this study uses Eisenhardt's principles.

In Hallen and Eisenhardt's article *Catalyzing strategies and efficient tie formation: How entrepreneurial firms obtain investment ties*, (2012) they claim that the strategies which executives use to form ties have been relatively unexplored by scholars, even though network ties are crucial for the performance of firms. At the beginning of the paper, they review a wide range of network studies, and conclude that network ties, portfolios and network levels all suggest that the performance of firms is increased when they have a large number of network connections, of different strengths and with the right partners. However, they also show that, although an emerging stream of research takes a strategic view of the formation of ties (Vissa, 2010), research in this area has yet to address the efficiency of tie formation or clarify the range of relevant strategies. Their research question therefore asks how companies form inter-organizational ties efficiently, especially with low-power actors such as entrepreneurs, and how this shapes critical network outcomes.

In order to address this research question, they focused on venture executives seeking new investment ties with corporate venture capital investors. They selected nine internet security ventures founded in 2002. They selected these ventures from the Venturexpert database, which provides accurate data about U.S. venture financing. In keeping with

their theory-building approach, they used theoretical sampling to select them, while also choosing ventures with at least one investment tie.

In keeping with their theory-building approach, the definition and assessment of tie formation efficiency were given by their informants. In general, they established several criteria (e.g. investment completion, time taken to form, investor desirability and so on). They used these criteria ‘because they indicate situations in which executives have not only successfully formed a tie, but have done so with a desired partner and/or from among desired partners’ (Hallen & Eisenhardt, 2012:42). They also used the individual case histories to conduct within-venture analysis, and then linked these activities to the outcome of each round. Each round provided capital for the near future and included one or more investors on the same terms. As a consequence, they engaged in repeated iterations until theoretical saturation occurred, closing the match between theory and data.

By using these criteria and data analysis procedures, they proposed two paths towards efficient tie formation. The first path resulted from those existing studies which show that firms have strong direct ties to desired potential partners. The second path, which they called catalyzing strategies, comprised their main findings and contributions. This second path occurs when firms lack strong direct ties or when desired potential partners lie outside the local network. With time variation, a focal firm uses *casual dating* (adding potential partners to the network), *timing around proofpoints* (sending strong signals about the quality of the focal firm’s idea), *scrutinizing interest* (culling potential partners with faked interest), and *crafting alternatives* (sending strong signals about scarcity). By using these principles, they clearly suggest that the finding can be

generalised, and they believe that ‘[c]atalyzing strategies are likely to be most germane for firms with intermediate embeddedness and quality’ (Hallen & Eisenhardt, 2012:56).

Having generalised their results, they proposed four analytical propositions, believing that these propositions can illustrate causal relationships in which an entrepreneur uses catalyzing strategies to form inter-organizational ties to promote the efficient performance of the firm. At the discussion stage, they stated their belief that this is a major contribution to the literature of networks and signaling: the new concept of tie formation efficiency. Their major insight is that those firms which form ties efficiently are more likely to achieve superior ties, portfolios and network outcomes. Their secondary contribution is their identification of two paths for the efficient formation of ties between firms. Unlike the existing work on strong ties, the second path relies on the new concept of catalyzing strategies. Their article also describes the use of different strategies at different stages of the process. Their third contribution is to link social embeddedness and information signals, as they clarify the ways in which these mechanisms relate to each other and are interconnected.

My work in this study follows Eisenhardt’s theory-building principles. Eisenhardt and her many colleagues examined the existing literature before beginning their own data analysis. They located the lacunae in this existing research and then, as a result of this, established their own research question. These principles are reflected in her other studies. Firstly, for instance, in an article published in *Administrative Science Quarterly*, she and Davis (2011) addressed the following research question: why do some inter-organizational relationships produce technological innovations while others do not? They identified a major gap in the existing studies, which is that partners have their own

established processes for innovation, which may conflict with each other. These conflicts may challenge technological collaborations and the management of symbiotic relationships. They identified this research gap by reviewing a large number of studies of collaborative innovation before conducting their analysis. By using this method of defining a research question, I formulated my research questions in Chapter 1: firstly, how do firms defeat competitors in standard wars? Secondly, how do institutional entrepreneurs manage their critical stakeholders, collective actions and discursive activities in processes of technological standard change? In Chapters 2 to 4, I further reviewed many studies of standard wars and institutional entrepreneurship, and established that discursive activities and the management of critical stakeholders are absent from existing studies. Therefore, using this principle, I was not only able to find theoretical omissions in existing studies, but also to construct a original conceptual framework for my own study. This conceptual framework, which is presented in Chapter 5, was my guide when conducting this analysis.

Secondly, in order to address another research question, Ozcan and Eisenhardt's article *Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance*, published in the *Academy of Management Journal* in 2009, theoretically sampled the U.S. wireless gaming industry. This industry is comprised of several types of often interdependent firms: handset makers, games platform providers, brand owners, games publishers and developers. This interdependence between portfolios is both common and important within the industry. The wireless gaming industry is also relatively new, so it is easier to follow the formation of portfolios. Ozcan and Eisenhardt chose entrepreneurial firms because they could track their portfolios from the firms' inception. By using these principles of theoretical sampling, I was able to briefly present my

chosen critical case, that of the standard war between Sony BD and Toshiba HD DVD. I will further explain the reasons for this in the next section.

Thirdly, in order to analyse their data, Eisenhardt and her colleagues varied their methods of data collection. In Hallen and Eisenhardt's (2012) article, they established several criteria before analysing their data, with the exception of the interview data. These criteria were determined by their informants. They conducted a large number of pilot interviews with two types of informants: venture executives with key responsibilities for raising a round, and representative investors who invested in it. Because the study was nascent, they depended on these pilot interviews to reveal practical information about catalyzing strategies. These criteria also encouraged them to focus on practical information. By using these principles to establish my data collection criteria, I was able to establish a number of criteria for each concept in the framework. I present these criteria in Chapter 5.

As well as interviews, Eisenhardt has also used a large amount of archival data in other studies. An instance of this is Santos and Eisenhardt's article, *Constructing markets and shaping boundaries: Entrepreneurial power in nascent fields*, published in the *Academy of Management Journal* in 2009. They used in-depth archival data to closely follow the ways in which five new firms in different nascent markets shaped their organizational boundaries during their initial years of existence. They used a number of audio/video sources, internal sources (e.g. all the press releases since the founding of the firm) and external sources (e.g. media articles about each firm, identified using ABI Inform) as their archival data. Following this principle of data collection, I used both interviews

and archival data (including both internal and external data). Section 6.5 will further describe my methods of data collection.

Fourthly, Eisenhardt uses a large number of cases, to allow her to build her theories. She claims that using many cases enables the researcher to build a more robust and generalisable theory than using a single case. However, in her 1989 principles, she also suggests a very flexible strategy for analysing data gathered from the case study. These procedures have been discussed in the previous section. In general, I use a 'causal network' to examine the causality of my one case and to explain it. By using open coding, I was able to generate texts which describe the meanings of materials.

Fifthly, Eisenhardt (1989) uses an emergent conceptual framework when discussing the extant literature, in order to refine their definitions of constructs, levels of abstraction and theoretical relationships. She and Hallen claim that the extant literature helped them to sharpen their underlying arguments. They made repeated iterations until they achieved a close match between the data and their theory. Following this example, I compared my new theory with other studies of standard wars, including empirical studies, to test its potential as an explanation of them.

6.3. Theoretical Sampling: Sony Blu-ray Disc vs. Toshiba HD DVD

As my one case study, I have chosen the standard war between Sony's Blu-ray Disc and Toshiba's HD DVD. This case incorporates most of the aspects of standard wars as outlined in the relevant literature. It has well-converged players and mature technologies in a mature institutional field. The technology is an incremental innovation

and numerous stakeholders are identified. Sony and Toshiba could easily identify who are the stakeholders in the field and were capable of foreseeing the potential development of critical events. Firstly, the companies, such as JVC, Phillips and Panasonic, had experience of developing relevant standards, . Secondly, the content providers and retailers were also well established stakeholders with considerable logistical networks who could help the institutional entrepreneurs to provide and issue the complementary products. Thirdly, because of the incremental characteristics of the mature technology, the institutional entrepreneurs were easily capable of understanding the expectations of the stakeholders although they chose to give priority to different expectations. Toshiba emphasized the manufacturing costs of HD DVD while Sony focused on the capacity and copyright protection mechanism of BD.

In addition, there is a great deal of readily available written data concerning this standard war, including media reports, official reports and the news archive, among other things. I have supplemented this with data collected in interviews. I also have connections with a high-level Sony manager who works at Sony's headquarters in Japan. He is one of the senior managers in the Sony BD Office, which is responsible for managing BD affairs for Sony. This connection provided me with access to the data which has not so far appeared in media reports and other public data sources. In this section, I will introduce the case and give a detailed rationale for choosing it.

Theoretical sampling means seeking the data which will enable one to elaborate an emerging theory. Its main purpose is to elaborate and refine the categories which constitute the building blocks of the theory concerned. The technique is emergent, as it involves constructing tentative categories. Before the researcher starts working on a

study, he needs an overall picture which will show him what he should study and what data he should collect. He should also ensure that the critical data sources are available or can be replaced. During the process of data analysis, this technique will show the researcher who he should interview or what he should next observe, according to the state of theory generation at that point.

I believe that the BD vs. HD DVD standard war clearly presents the issues of institutional change and standard wars, and also fits the features of institutional entrepreneurship. There are three main reasons why the BD-HD DVD case is suitable for this research. First, the literature review highlights the role of network positions and social relations in the field, which show how important it is for participants to have had experience of previous standard wars. It was apparent from media reports that both Sony and Toshiba had much experience of previous standard wars.

Secondly, other studies of institutional entrepreneurship also emphasise the importance of discursive activity and of alliances with stakeholders in implicit way. For instance, Garud et al. (2002) stress the way in which Sun persuaded important stakeholders to engage in their alliance with Java. Moreover, by using discursive activities, Sun was able to teach independent software developers and publishers the nature of the Java technology. In the BD vs. HD DVD case, both Sony and Toshiba made alliances with critical stakeholders, including consumer electronic product manufacturers and content providers, throughout the standard war. They also engaged in discursive activities to communicate information to, and construct meanings for, their critical stakeholders, prospective organizations, and consumers demonstrating the advantages of the BD standard.

Thirdly, the issue of power has attracted increasing attention in recent studies of organizational institutionalism. For instance, Suddaby (2010) argues, in his discussion of the ‘challenges for institutional theory’, that the role of power has largely been neglected, and should be given a central place in current efforts to understand why and how organizations attend to their institutional environments. The BD vs. HD DVD case not only reflects the attributes that have been identified in earlier standard wars studies, but also integrates crucial developments and viewpoints. In turn, the findings produced by analysing the standard war can be generalised in order to understand both the process of standard wars and also institutional entrepreneurship in general.

6.4. The Data Collection Process

Data for this study was collected from a variety of sources. Media reports were collected from Birkbeck Library (using Business Source Premier), Senate House Library (News ProQuest⁹), and City Business Library (Euromonitor and DataMonitor). Other types of data, including patent data (from WIPO, the World Intellectual Patent Organization), official documents and market sales figures, were collected from official websites and other databases. I also conducted several interviews, both face-to-face and email, with a Japanese corporate manager and a *New York Times* journalist. The media reports in the dataset included those from magazines (*Business Week*, *The Economist*, *Black Enterprise*, *economist.com*, *Marketing*, *Newsweek*, *TWICE*, *U.S. News and World Report*, *Wired*, and *Video Business*), newspapers (*Financial Times*, *New York Times*, *San Jose Mercury News*, *The Wall Street Journal Eastern Edition*, and *TechWeb*), and trade

⁹ I downloaded the data from Business Source Premier and News ProQuest databases and reformatted their font size and space to a PDF file, mainly to save paper.

publications (*EBN (Electronic Buyers News), Computer Technology Review, Dealerscope, Emedia, Computerworld, Broadcasting & Cable, ft.com, DSN Retailing Today, Brandweek, AdvertisingAge, Electronic Business, EventDV, TelevisionWeek, Network Computing, New Media Age and Retailing Today*). Table 6.1 summarizes the names of databases and the number of reports which were included in the dataset.

Table 6.1 Summary of Databases and Numbers of (News) Reports

Database	Number of (News) Reports
Business Source Premier (Birkbeck)	888 (only trade publications available)
News ProQuest (Senate House Library)	1840 (including trade publications, newspapers, magazines)
DataMonitor (City Business Library)	4 reports from Business Insights
DataMonitor	Company profile reports for 14 companies
DataMonitor	7 Industry Profile reports
Euromonitor (City Business Library)	Statistics
BD archival data	BD news releases from 2002 to 2008
	BDA by-law v.1.9
Sony website	Annual reports from 2002 to 2008
Toshiba website	Annual reports from 2002 to 2008
WIPO	Patent data of BD and HD DVD
DVD Forum archival data	DVD information and limited HD DVD information

Source: Author

In this dataset, it was very difficult to access information from the Toshiba camp, including from the DVD Forum and Toshiba's official website. This is because the relevant information has been removed from the websites. When I conducted the interview with my Japanese informant in Tokyo, he also stated that it is very difficult to persuade Toshiba people to talk about this standard war, because they do not want to lose face again. For this reason, I tried to search HD DVD relevant information in Toshiba annual reports from 2002 to 2008. No piece of information relating HD DVD in 2003 report. Few information in 2004 (3) and 2005 (5). Rather than illustrating the technology, the reports "announced" that HD DVD will differentiate Toshiba from its competitors moving toward high definition content. Interestingly, in 2006, the annual report has more information about the standard. The report has few pages about 'Interview with the President'. The interview mentions the launch of HD DVD. However, the president (Atsutoshi Nishida) does not mention any piece of information about HD DVD. Instead, the rest of report promotes that Toshiba led the world in commercialization of HD DVD players (HD-XA1). The 2007 report releases not only product launch (the second HD DVD player: HD-XA2) but also some discursive activities for customers. However, the relevant information can be found in many media reports. Finally, in the 2008 report, I expect that Toshiba would discuss the standard wars. However, the report devotes only a few pages to HD DVD. In particular, it does not contain any discussion about the reasons for Toshiba's defeat in this standard war. I therefore attempted to collect a greater number of media reports and other data about this standard war, in order to accrue more information about Toshiba's strategies.

The dataset excludes other interview data from critical stakeholders in the study. It was very difficult to access informants from these stakeholders. Because, I do not have the

connections with them and do not have budgets to conduct the interviews. This study aims at answering how institutional perspective can complement the functionalist perspective to understand the institutionalization processes in mature eco-system. In the standard war, Sony and Toshiba's actions intensively associated with the stakeholders' actions and response. In some extent, collecting and studying the focal firms' activities in the standard war can capture and grasp the stakeholders' activities towards the standards. Consequently, this study safely ignore in a sense that I do not conduct interviews with the stakeholders but collect much more media reports to grasp their activities with regard to the standards.

The process of data analysis led to the collection of further material. At the beginning of the data analysis, I read the media reports and memos, and used open coding to analyze both. The results of this prompted me to collect more data from other sources. For example, in order to understand the sales figures, I collected data from the Datamonitor and Euromonitor databases in City Business Library. I collected other relevant data about the BD vs. HD DVD standard war, as well as about other standard wars such as VHS vs. Betamax and SD vs. MMCD, from the SSCI database. In order to analyze the roles played by video game consoles and the profiles of video gamers, I collected the profiles of video gamers in the United States between 2005 and 2010. I also collected data from Datamonitor and Euromonitor concerning the market size of computers and video players in U.S. between 2005 and 2010, as well as those of video games hardware and software, home audio and cinema, televisions and projectors in the U.S. between 2005 and 2010. In order to understand the histories of other standard wars, I collected six studies from the SSCI database. My research into the histories and strategies of Sony, Toshiba, and Microsoft involved collecting reports from Datamonitor, including

data on the game console industry, the future digital home, movies and entertainment in North America, and PCs in the U.S.. To understand the structure of BDA and the BDA by-law (v1.9), I collected data from the BD official website, www.blu-raydisc.com¹⁰. Finally, to understand the development of the optical patents of Sony and Toshiba, I collected data from WIPO.

Finally, the establishment and management of collaborations is an extremely critical issue in a standard war. The BDA website allows access to official documents concerning the collaboration. However, in order to collect further inside information about the BDA, I conducted a face-to-face interview in Tokyo, Japan, in March 2009. This was made possible through a research grant from the University of London Central Research Fund. The questions are listed in Appendix 1. Many questions emerged during the interview as ways of following up the answers of my informant.

This interview provides the study with many critical viewpoints. After I had conducted it, I began analysing the dataset in detail. In 2011, I conducted a second interview with the same Japanese informant via email. Further, in order to triangulate my primary findings, I also emailed questions to several journalists, columnists and scholars. Their names were obtained using media reports and research articles; I obtained their email addresses from Google. However, only one journalist, a writer for the *New York Times*, responded to the questions. The questions from the secondary interviews are listed in Appendix 2.

¹⁰ The relevant information concerning HD DVD has been removed by the DVD Forum.

In order to clearly identify the relationships between the guidelines proposed in Chapter 5 and the data sources, I prepared a synopsis table (6.2), in order to show each guideline and its corresponding data sources.

Table 6.2. Synopsis of Data Themes and the Corresponding Data Sources

Guidelines	Main data sources
Power	
The number of patents relating to the new standard developed by institutional entrepreneurs.	WIPO database
The number of patents per year related to the new standard produced in collaboration by institutional entrepreneurs, critical stakeholders, and prospective organizations during the standard war.	WIPO database
Institutional entrepreneurs' experience of previous standard wars.	Media reports, eg. Belson, K., & Sorkin, A.R. Sep. 15, 2004. Buying MGM may give Sony more leverage to set a new DVD standard. <i>The New York Times</i> , C.6.
Legitimacy	
The previous product relevant performance of critical stakeholder partners.	Datamonitor reports (company profiles)
The previous performance of the institutional entrepreneur's star products.	Datamonitor reports (company profiles) 2. Annual reports and official websites
The business segments relevant to institutional entrepreneurs and their critical stakeholders.	Sony, Toshiba and many other critical stakeholders' Annual Reports Datamonitor reports (company profiles)
Critical Stakeholder Management Capability	
The specific responses of institutional entrepreneurs to the expectations and requirements of critical stakeholders.	Media reports, eg. Nakamoto, M., 21 Apr 2005. 'Blu-ray disc set to be the basis', <i>ft.com</i> , p.1 BDA website, news archive Interview with New York Times journalist

Guidelines	Main data sources
The specific expectations about the new standard, as announced by critical stakeholders in media reports.	Media reports, eg. Chmielewski, D.C., 15 Jul 2004. 'Consortium to set rules for successor to DVD', <i>San Jose Mercury News</i> , p.3C. BDA website, news archive Interview with New York Times journalist
The specific performance of new standards, related to the expectations of critical stakeholders.	Media reports, eg. The Economist, 14 Dec. 2004. 'Battle of the blues', (8303, p.14) BDA website, news archive Interview with New York Times journalist
The actions of groups of critical stakeholders which establish the primary specifications of standards what the institutional entrepreneurs want.	Media reports, eg. Anthes, G. H., 26 Apr 2004. 'Optical storage sings the blues', <i>Computerworld</i> , 38(17): 22-23. BDA website, news archive Interview with New York Times journalist
Collaboration Structuring Capability	
The membership structure of collaborations.	BDA and DVD Forum websites Interview with Japanese informant.
The mission statements of different member organizations in collaborations	BDA and DVD Forum websites Interview with Japanese informant.
Collaborative R&D activities in relation to the specification of the new standard.	BDA and DVD Forum websites Interview with Japanese informant; WIPO database
Formal communication between members of collaborations.	BDA and DVD Forum websites Interview with Japanese informant.
Discursive Activities	
The discursive activities directed to the audience which provide compelling reasons for adoption of the new standard.	Media reports, eg. Kerschbaumer, K., 25 Oct 2004. 'Seize the day', <i>Broadcasting & Cable</i> , 134(43): 28. BDA website, news archive

Guidelines	Main data sources
The discursive activities directed to the audience which undermine its rivals and the existing standard.	Media reports, eg. McBride, S. 9 December 2004. 'Disney to support Sony DVD format', <i>Wall Street Journal</i> , B.8. BDA website, news archive
The discursive activities which seek legitimacy of the new standard from the audience	Media reports, eg. Zaun, T., 30 Nov 2004. 'Four studios give backing to a format for DVD's', <i>New York Times</i> (East Coast), p: C6. BDA website, news archive
The discursive activities which respond to criticisms and questions proposed by competitors and audience.	Media reports, eg. Yoshida, J. & Hara, Y., Nov. 17 2003. 'New DVD format mired in debate: Rival camps battle for control of high-definition standard', <i>EBN</i> , p: 3. BDA website, news archive
The discursive activities which promote the new standard and its performance.	Media reports, eg. The Economist, 13 May 2006. 'Business: Everything to play for; video games', Volume 379: 79. BDA website, news archive
The discursive activities which are presented in professional exhibitions and conferences.	Media reports, eg. Dritsas, D. Nov 2004. 'Signs from the east', <i>Dealerscope</i> , 46(11): 60. BDA website news archive
The discursive activities initiated by spokespersons.	Media reports, eg. Wingfield, N. 20 Oct 2005. 'H-P seeks compromise with Microsoft', <i>The Wall Street Journal</i> (East edition), p: B3. BDA website news archive
Network Effects	
The number of particular products (produced by the new standard and its previous version) before and during the standard war.	The accurate data is not available, but there are some relevant numbers and statistics in the database and media reports, eg. The Economist, 18 Nov 2006. 'Playing a long game', <i>Volume 8504</i> , p: 71. Datamonitor database Euromonitor database

Guidelines	Main data sources
The monthly sales (units) of a product produced by a particular standard during the standard war.	The information is not available. The database, Nielsen Videoscan, may provide the data, but it is not available, either.
The number of complementary goods in the market per month associated with a particular standard during the standard war.	The monthly number is not available, but there are some relevant numbers and statistics in the database and media reports, eg. Belson, K., 17 Aug 2005. 'Lions Gate is said ready to support Blu-ray discs', <i>The New York Times</i> : C4. Euromonitor database
Product Performance	
Capacity	Media reports, eg. The Economist, 14 Dec 2002, 'Battle of the blues', Volume 8303: 14. Datamonitor database
Compatibility	Media reports, eg. Paone, J., January 2004. 'High definition DVD on the horizon', <i>Dealerscope</i> , 46(1): 100.
Quality of sound and display	Media reports, eg. Heiland, V., December 2004. 'Blue highways', <i>Emedia</i> , 17(12): 16-21. Datamonitor database Sony and Toshiba official websites
Copyright protection	Media reports, eg. Karkoff, J., 1 Jan 2007. 'Studios' DVDs face a crack in security', <i>The New York Times</i> , p. C1. Datamonitor database
Price	Media reports, eg. Taylor, P., 26 Feb 2007. 'Sony to offer cut-price Blu-ray player', <i>FT.com</i> , p:1. Datamonitor database

Source: Author

6.5. The Data Analysis Process

Coding is a crucial part in analyzing the data in grounded theory, in particular. Coding refers to ‘a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories’ (Strauss & Corbin, 1990: 96). Broadly, the activity of open coding comprises “breaking the data down into discrete parts, comparing them for similarities and differences and grouping them under more abstract concepts to form categories” (Strauss & Corbin, 1998: 101). Open coding is a central first step in the analysis of data in grounded theory. However, it is not exclusive for grounded theory as a specific approach. More generally, open coding can be seen as a systematic way to analyze data which is one of the few common characteristics of qualitative studies (Gray, 2009: ch. 18; Bryman & Bell, 2007: ch.22; Saunders et al, 2012: ch. 13). This study applies open coding in accordance with general principles for categorizing and unitizing data in qualitative studies without adopting the subsequent steps (axial coding and selective coding) in grounded theory in the way prescribed by this approach.

Broadly, I analyze the media reports line-by-line. Because these media reports are not messy information. Instead, they have been ‘distilled’ and organized by journalists. I can easily understand the information provided by the media report. It is unnecessary to analyze the data word-by-word.

I used Numbers, the substitute software for Microsoft Excel in Mac, to record the codes, memos and theoretical perspectives (although many other qualitative study softwares exist, such as NVivo, CAQDAS, among others). In order to sharpen my memory and

increase my attention to detail, I chose to manually code the data, so that, I coded nearly every piece of data in the dataset for this study, apart from the technical reports.

The coding book used to code the media reports has several columns: date and publications, statements, categories, and theoretical memos (as in Table 6.3).

Table 6.3. Schematic List of the Stages in the Development of Theory Using Analytical Techniques of Open Coding

Columns	Comment
1. Date and publications	The source (date and publications) of the data.
2. Statements	The citations of the data.
3. Categories	Use the cited data to develop categories which fit the data, together with accumulation of examples of a particular category in order to clarify its meaning.
4. Theoretical memos	Defining of the categories and recording of the criteria in columns. Grouping of the categories according to the pre-conceived theoretical framework. Further consideration of the relationships and links between the categories. Where there were additional findings (i.e. unintegrated categories), further checking of the definitions, collection of further examples, and, in some cases, theoretical sampling of further more data.

Table 6.4 includes examples of how I produced theoretical categories in my study. The table includes parts of D.C. Chimielewski’s report in *San Jose Mercury News* on 30 November 2004, of T. Zaun’s report in *New York Times* on 30 November 2004, and of *The Economist* on 14 December 2002. These citations are just the small pieces of the Appendix 3, Documenting the Process of Data Analysis.

I distill categories of 'Influence of Critical Stakeholders', 'First Mover Advantage', and 'Backward Compatibility'. By using comparison, I find out that 'stakeholder' is a critical part in the standard war. Hence, I further dig into the data, I find out more specific categories like 'responding requirements', 'seeking exclusive support', and so forth. Hollywood studios and dealers can be seen as critical stakeholders in theorizing specifications of new standard and promoting and shipping products to customers. Thus, I claim, having a capability to manage these critical stakeholders is crucial in standard wars. The category 'critical stakeholder management capability' is the aggregate product of such analytical steps.

Table 6.4. The Example of Analyzing the Data by Using Open Coding

Date and publications	Statements	Categories	Theoretical memos
<p>D.C. Chmielewski, <i>San Jose Mercury News</i>, 30 November 2004</p>	<p>Universal Pictures, Paramount Home Entertainment and Warner Bros. announced they would release movies in HD DVD, the new high definition DVD format developed by Toshiba and NEC. The studios timed the HD DVD announcement to come well in advance of the January Consumer Electronics Show in Las Vegas, where the nation's retailers make buying decisions for the coming year. Hollywood hopes to persuade these buyers -- and hardware manufacturers -- to get behind a single, next-generation DVD format.</p>	<p>Influence of critical stakeholders</p>	<p>This report shows these studios, from the HD DVD camp, attempting to persuade other companies to join that camp. As the literature review suggests, having market-leading organizations as part of its critical stakeholders might help a focal firm to attract other companies to join that collaboration. This is because they can attract other companies by using their existing networks. It shows that, firstly, the HD DVD standard had the leading position in the market at this point. Secondly, critical stakeholders can use their comments might influence further the perceptions and actions of other companies.</p>

Date and publications	Statements	Categories	Theoretical memos
T. Zaun, <i>New York Times</i> , 30 November 2004.	In addition to the Paramount Home Entertainment unit of Viacom, Universal Pictures, Warner Brothers Studios and New Line Cinema also said they would release titles in the HD DVD format, which its creators promise will offer sharper images and more of the interactive features that have helped make DVD's popular.	First mover advantage	First-mover advantage refers a edge that a company gains by entering a particular market before any competitors. The advantages in capturing critical resources create incentives for investing in technological adjustment. In 2004, at the very beginning of this standard war, the HD DVD standard had more support from film studios because of its cheaper production costs and backward compatibility. Based on these statements, I define that Toshiba had first mover advantage in the standard war.

Date and publications	Statements	Categories	Theoretical memos
<p><i>The Economist</i>, 14 December 2002.</p>	<p>NEC/Toshiba design will be "backwardly compatible" with today's DVDs. That could be a significant advantage in the marketplace, saving videophiles from having to replace their film collections, or having to use a second player for older discs.</p>	<p>Backward compatibility</p>	<p>Backward compatibility' is defined as the ability of a new storage device to work with input generated by an older device. This compatibility meant that Toshiba had more support from Hollywood studios at the beginning of the standard war, because the compatibility can result in lower production costs to Hollywood studios. Toshiba announced that HD DVD players would be able to read existing DVDs as part of its extension of the DVD standard, an announcement which greatly benefited HD DVD, even though HD DVD did not have the greater capacity of BD.</p>

Chapter 7. Data Analysis

In 2002, Sony announced that, in cooperation with eight other leading companies, they had established the basic specifications for a next-generation large capacity optical disc video recording standard called Blu-ray Disc (BD). The standard was incrementally developed by the previous standard (Betamax, CD, and MMCD). Because Sony learnt from the previous standard wars, thus the standard provides higher storage capacity and better copyright protection for DVDs. Toshiba also announced the HD DVD standard in order to compete with Sony. During 2002 to 2008, there were many observable events can be analyzed, of course. However, the development of both standards result from the experience on previous standard wars and their products. Before 2002, both companies have had considerable patents relating to the standards. In order to compete with each other, during 2002 to 2006, both companies tries to gain the support of stakeholder. They promoted their own ideas and criticized each other's technical problems using the media, technical exhibitions by using their own collaborations and stakeholders. To begin with, HD DVD seemed to have gained the lead in terms of support from movie studios in 2004. The standard seemed also to have gained the lead in terms of market share in 2006. However, many studios and video retailers announced that they were exclusively supporting the BD format. In January 2008, Warner Brothers announced that it would not support the HD DVD standard. This announcement caused a chain reaction among DVD retailers. Subsequently, in early 2008, Toshiba announced that they would no longer support any aspect of the HD DVD format, including its hardware, software and supporting specifications. Sony had won the competition and BD had become the new technological standard.

Section 1.4. briefly presents the case in a chronological way. Both companies have had the experience on initiating standard wars (Toshiba's DVD and Sony's Betamax, CD, and MMCD). The BD and HD DVD standards can be seen as incremental innovations based on these previous ones. Having these standard wars, the other stakeholders are also converged in the mature field. Both Sony and Toshiba, in some extent, have known their interests and expectations. In a way, the industry expects that a new standard should have greater storage capacity and better copyright protection mechanism. Even so, we believe that the traditional functionalist viewpoint is inadequate to understand the institutional forces which are involved in the social shaping of technology even in a mature field with established institutional logics such as the BD HD DVD case. Consequently, the following data analysis will show that studying the role of institutional entrepreneurship in standard war can complement the traditional viewpoint.

Before presenting the analysis of the BD-HD DVD standard war, the study reviews many other studies of the same case. A search of the SSCI database showed five other studies of this standard war (van den Ende, van de Kaa, den Uijl, & de Vries, 2012; Lee, Choi & Cho, 2011; Daidj, Grazia & Hammoudi, 2010; Spark, 2009; Shiu, 2009). Because some studies are not available and the subject is so different to mine, this section will only discuss the studies of Daidj et al. (2010), Shiu (2009), and van den Ende et al.'s (2012) studies.

Daidj et al. (2010) use game theory to study the case of BD-HD DVD. Although an economic approach is not central to their study, they also review the process of the standardization. In general, this study confirms the importance of collaboration in the case. However, some of the data and viewpoints in their study are incorrect. For

example, the study states that this standard war lasted for five years. This is because much of the media began to report the standard war in 2004. However, the BDF was established in 2002, so the duration of this standard war was actually seven years.

Shiu (2009) also uses this case to study innovation behaviours in standard wars. Because the article was published as part of the proceedings of a conference which is not collected by the university library, I asked the author for an e-copy. However, he told me that he was unable to locate the file and instead sent me the questionnaire only. This just focuses on the individual level and is not part of the organizational and inter-organizational level research in the study. I am therefore unable to refer to Shiu's work or to compare my findings with it.

Finally, van den Ende and his colleagues' (2012) study focuses on the role of inter-organizational networks for coordinated action and information exchange in standard flexibility. The standard flexibility refers to "the number and degree of changes to a standard over time" (van den Ende et al., 2012: 706). It can enhance both network diversity and size and the diversity of standard-supporting networks will have further effects on standard flexibility. The study is pretty similar with mine, I will present the findings in detail.

In their research, they study how coordinated action can facilitate cooperative behavior. Information can provide actors with opportunities. Thus, having coordinated action can lead to exploration of those opportunities (Podolny & Baron, 1997). Moreover, collective action leads to an extension of the network of standard stakeholders (the study uses 'supporters'), the legitimacy of the network is often strengthened. The study

expects that diverse network members can use their knowledge and the experience acquired in the standard diffusion process to define and theorize the future direction of the standard. Collective action serves to adapt the standard to the requirements of supporters. In this vein, the modification of the standard will attract more members in relevant industries, further increasing the diversity and size of the network.

This study uses three standard wars to explore the process of standard flexibility. BD vs. HD DVD is one of the cases. They suggest three phases in the development of standard flexibility in the standard war. In the first period, a limited number of companies from the same or relevant industry started developing the standard. In the second period, the initiators started inviting companies from other industries. Thus, the initiators started adapting the standard. The third phase started when BD standard became dominant, the network of supporters became stable although the standard continued to be adapted to new requirements. The study also found that price, early timing of market entrance and technical superiority are of influence, but are not decisive.

van den Ende and his colleagues' study presents the role of stakeholders (network of supporters), collaboration (interorganizational networks for coordinated action and information exchange) and framing (adapting the standard to the requirements of supporters will attract more members in relevant industries) as critical attributes in the study. In a sense, having good standard flexibility can be seen as product performance, because stakeholders' information exchange and requirements can make initiators to adopt and satisfy their requirements then attract more participation. However, this study fails to discuss how to manage initiators' stakeholders in collaboration and their audiences (external group in this study). My study will explicitly discuss not only the

role of critical stakeholders and discursive activities but also the practices of them in standard wars.

Some of these studies grasp the inward nature of the standard war. For example, Shiu (2009) studies the innovation behaviors on individual level while van den Ende and his colleagues (2012) focused on the issue of standard flexibility. This insight factor approach studies a hidden nature of perceiving in an intuitive manner. Rather, process approach takes different manner to analyze the series of actions, changes, or functions bringing about the result, like Daidj et al. (2010) and some other distinctive studies of institutional entrepreneurship (e.g., Garud et al., 2002, Munir & Phillips, 2005). For example, Garud and his colleagues use media reports to generate a chronology of critical events in the Java case then recognize the theoretical issues and constructs that emerged from the data. Munir and Phillips also use the same approach to chronicle critical events and discursive activities of which Kodak managed to “transform photography from a highly specialized activity to one that became an integral part of everyday life” (Munir & Phillips: 1665).

This study will integrate these two approaches to analyze the standard war. The aim of this study is to complement the traditional functionalist’s viewpoint on standard wars by using institutional entrepreneurship perspective. Not only economic accounts (network effects and product performance), based on the research questions and the conceptual framework in Chapter 5, this study also pays more attentions on how institutional entrepreneurs manage collective action (including critical stakeholder management) and discursive activities (social accounts) in technological standard change process. In a way, this study is able to grasps the hidden nature of institutional entrepreneurship in

standard wars. However, the outcome of this approach is to divide the documentations and descriptions of the critical events in a random manner. Consequently, the way of the presentation will violate the readability of the empirical case. In contrast, the process approach is advantageous on chronicling the critical events of empirical cases in sequence and providing thick descriptions. In a way, the causal relationships between variables would be found. However, sticking in sequential events may blur the causal relationships what the conceptual framework wants to be approved.

Consequently, in order to clearly document the critical events of the empirical case and approve the causal relationships proposed in Chapter 5, this study integrates these two approaches. In general, the standard is divided three different phases: before 2002, from 2002 to 2006, and from 2006 to 2008. In the first phase, the study shows how power and legitimacy of the two companies made it possible for them to initiate the development of the new standard and to engage in the standard war. Their power and legitimacy are reflected in the performance of their star products, the business segments of the companies themselves as well as their critical stakeholders, the experience of previous standard wars, and their networking with stakeholders. The analysis of this stage will also document that the new standards are incremental innovations of previous standards. It will show that the industry is a mature field where the stakeholders have been well-converged by the previous standard wars and/or R&D alliances.

In the second phase, both Sony and Toshiba collaborated with stakeholders to manage various stakeholders, develop the products, organize promotion, and many discursive activities, such as promoting, undermining, debating, and so forth. According to the

conceptual framework, these activities are the heart of the institutional entrepreneurship in this phase.

The final phase, from 2006 to 2008, can be titled ‘the market war’. Both camps launched their disc players associated with the new standards. Sony also launched a new game console, PlayStation 3 (PS3) which is associated with the BD standard. It functioned as a Trojan Horse to boost the market share of the BD standard in the standard war. Furthermore, in order to enhance stakeholders’ exclusive support, Toshiba gave financial incentives to Paramount and DreamWorks which had the effect that these two studios announced that they would no longer support the BD standard. However, in the early 2008, Warner Brothers announced that it would exclusively support the BD standard. It caused a chain reaction among other stakeholders, such as retailers. Later, Toshiba announced that it would no longer produce the relevant hardware and software of HD DVD standard.

Although the process is divided into three phases, this does not mean that the effects of critical variables are only constrained to specific phases. Rather, power, legitimacy, collective action, and discursive activities influenced each other interactively throughout the process.

7.1. Before 2002: Power and Legitimacy

According to the conceptual framework in Chapter 5, power and legitimacy can be seen as institutional entrepreneur’s resources in the standard war. The study finds that the institutional entrepreneurs have to establish their power and legitimacy to the new

standard before initiating the standard war. This section will review the history of these two focal firms and analyze the previous star products performance and the main business segment of the focal firms and their critical stakeholders. They may play a role on the technological trajectory of the incremental innovations.

7.1.1. Legitimacy: The Performance of Star Products

This section will present the legitimacy of these two institutional entrepreneurs. As foregoing discussion in the thesis, the new standards were incrementally developed from previous standards. In a way, we need to understand the performance of relevant products. The best way is to review the history.

Before initiating the standard war, Sony and Toshiba are the leading companies in the relevant industries. Due to their respective histories, Sony and Toshiba have shown outstanding performance for specific products. In general, Sony is more focused on consumer electronic products while Toshiba is more of a manufacturer of electronic equipment.

7.1.1.1. Brief Presentation of the History of Sony and Toshiba

1. The History of Sony

In 1946, after World War II, Sony was founded as the Tokyo Telecommunications Engineering Corporation. The company changed the name to Sony in 1958. This name

was a combination of the Latin word 'sonus', meaning 'sound', and 'sonny', a nickname for a young boy.

In the 1960s, Sony developed the Trinitron technology, which radically improved the quality of color television displays. Their CRT (Cathode Ray Tube) television, which was based on this technology, later became immensely popular. In 1979, the Sony Walkman, a compact cassette tape player, became their biggest success. The Trinitron technology and the Walkman led to Sony's production of high-quality computer monitors, home VTRs (Video Tape Recorders), passport-sized camcorders, digital cameras and many other products. In strategies developed by Sony, hardware and software are seen as the 'two wheels of a car'. For this reason, Sony initiated a joint venture with CBS Records in 1968. Sony acquired the remaining shares of CBS Records in 1988 and renamed it Sony Music Entertainment. In 1989, Sony acquired Columbia Pictures for \$6 billion, and then renamed that organization Sony Pictures Entertainment.

In 1993, Sony established Sony Computer Entertainment as a joint venture with Sony Music Entertainment. PlayStation (PS) was first released in 1994, and their market share rapidly increased. In 2000, Playstation 2 (PS2) was released with a DVD player, as well as upgraded music and video features. By 2006, Sony had sold 100 million game platforms and 1 billion game titles (Sony Annual Report, 2006, p.28). Later, Sony launched its portable PlayStation (PSP), which can access servers through a wireless connection. This history demonstrates why Sony is the leading player in the games console business.

One can see, from this short history, how Sony has grown around its audio and video business. It is also capable of seeking opportunities in new businesses such as music, film, and games, and, as a result, had developed many outstanding consumer electronics before the launch of the BD standard, such as the transistor radio in 1955, the Trinitron color television in 1968, the Walkman in 1979 and the PlayStation in 1994. It was also one of the initiators of the DVD standard in 1997. Sony has developed many dominant designs and dominated the consumer electronic industry throughout its history. The ‘Sony Style’ is not only the name of its retail store, but also acts as a kind of guarantee in terms of product performance, art and design.

2. The History of Toshiba

Toshiba was established in 1875 as the Tanaka Engineering Works, an engineering company. The company diversified, evolving into a manufacturer of consumer products, and in 1899 was renamed Tokyo Denki (the Tokyo Electric Company).

Among the company’s major successes were the production of Japan’s first washing machine and refrigerator, both in 1930, and of Japan’s first vacuum cleaner a year later. In 1939, the Tanaka Engineering Works and Tokyo Denki merged, to form an integrated electric equipment manufacturer, the Tokyo Shibaura Electric Company. In 1984, the company changed its name to Toshiba.

Toshiba entered the home video and film business in 1991, acquiring a 12.5% stake in Time Warner. Between 2002 and 2008, Toshiba focused solely on the manufacturing of electronics equipment. According to Toshiba’s Company Profile in *Datamonitor* (2010),

Toshiba acquired Wuxi Huazhi Semiconductor in 2002, Hawaii Business Equipment (one of the world's main independent office equipment dealers) and GE Automation Systems Corporation in 2003, together with Panasonic Shikoku Electronics Company's HDD (hard disk drive) design centre in California, among others. More directly relevant to the HD DVD standard were its acquisition of Amuse Pictures in 2003, and its signing of an agreement to develop consumer electronics devices and PCs in collaboration with Microsoft Corporation.

7.1.2. Legitimacy: The Main Business Segments of Critical Stakeholders

Except for the general histories of these firms, the main business segments of the institutional entrepreneurs and their critical stakeholder may decide the legitimacy of the new standards and the direction of the technology trajectory.

A 'business segment' is defined as being a component of an enterprise that provides a single service product or group of related products. The main products or services of an organization are normally those that give it the largest economic returns. They will be described as the main business segments of that organization. When the business segments of a critical stakeholder are evaluated highly in relation to a specific standard, and when they support this standard, the audience may be less likely to raise questions about the standard's quality.

In order to describe the role of institutional entrepreneurs, and the main business segments and patent R&D activities of their critical stakeholders in the optical technology industry, I mainly collected relevant data from Datamonitor.

Table 7.1 The Main Segments of Critical Stakeholders

Companies	Main Segments*
Sony	Electronics (audio, video, television, information and communication and others), game (Sony's video games consoles and others), pictures (motion picture production, home entertainment production, television broadcasting, and digital content creation), financial services, and others (Sony Music Entertainment and others).
Dell	Desktop PCs, servers, networking products, storage, mobility products, software and peripherals, and other services.
Hitachi	Environmental systems and industrial plant business. It is also engaged in the manufacture of precision machinery, industrial machinery, process equipment, steel structure, construction machinery and disaster prevention systems.
HP	PCs and related access devices, imaging and printing-related products and services, enterprise information technology (IT) infrastructure and technology services.
LG	Trading of commodities, industrial products, information technology products and consumer goods.
Panasonic	The manufacturing and marketing of audio and video equipment, information and communications equipment, home appliances, and other components and devices.
Mitsubishi	The leading integrated industrial electronics manufacturers in the world.
Pioneer	Engaged in the manufacturing and sale of electronic products.
Phillips	Manufacturing of medical systems, consumer electronics, lighting products and semiconductors.
Samsung	The leading consumer electronics brand in the world.
Sharp	The leading provider of electronic components, computer hardware and components.
TDK	Manufacturer of recording media, ferrite products and recording device products, and a major producer of inductors, ceramic capacitors, magnets, hard disk drive heads and other components.

Companies	Main Segments*
Thomson Multimedia (now renamed Thomson SA)	Provides technology, services, and systems for media and entertainment industries.
Toshiba	Digital products, social infrastructure systems, electronic devices, home appliances etc.
NEC	Aerospace, education, government, healthcare, retail and telecommunications.
Microsoft	Software (including personal, business and home & educational), entertainment, hardware and mobile devices.

Source: Company Profiles in Datamonitor

According to media reports in the dataset, Toshiba allied with NEC and Microsoft in the HD DVD camp. However, Table 7.1 presents that consumer electronic product is not NEC and Microsoft's main business segment. In the standard war, even though Toshiba had the strong support of Microsoft in this standard war (Vista system supported the HD DVD standard, but BD camp could find a way to minimize the impact), many companies still chose the BD standard rather than the HD DVD. In contrast, Sony had many other critical stakeholders, who could offer a variety of products and services (including consumer electronics, PC, recording media manufacturing, and so forth). The body of network literature suggest that if collaborations contain a mixture of strong and weak ties, they are more likely to be high performing. Moreover, the finding of this section show that the product performance of critical stakeholders can strengthen the collective action and discursive activities of institutional entrepreneurs during standard wars.

Summarizing for Sony, it operates in the electronics, gaming, film, and financial services segments, among others. In the electronics segment, in particular, it engages in

the design, development, manufacturing and sales of a range of electronic equipment, instruments and devices for both the professional and consumer markets. Sony's games segment operates through its subsidiaries, Sony Computer Entertainment Europe (SCEE), Sony Computer Entertainment Inc. (SCEI), and Sony Computer Entertainment America (SCEA). These subsidiaries own the famous game consoles, the PS2 and PS3. The film segment is involved in motion picture and home entertainment production, television broadcasting and the creation of digital content. In this segment, Sony operates through its subsidiary, Sony Pictures Entertainment (SPE), the owner of Columbia TriStar Pictures. Sony owns game consoles, movie studios, manufacturing plants, and many other segments with relevance to the BD standard. In other words, Sony contains many elements which are necessary for this standard war.

Toshiba and NEC were the main founders of the HD DVD camp, and Toshiba was its leader. According to its company profile report on *Datamonitor* (2010), Toshiba has about 199,000 employees. Toshiba's main segments are not consumer electronics and service. It is a diversified manufacturer and marketer of advanced electronic and electrical products, and its product portfolio includes information and communications equipment and systems, internet-based solutions and services, electronic components and materials, power systems, industrial and social infrastructure systems and household appliances.

To sum up in this section, these company histories demonstrate that Sony and Toshiba are positioned in different business segments, and these differences in the two companies led them to use different strategies in this standard war. Toshiba's strategy was to emphasise that the HD DVD standard could be produced and upgraded from the

DVD standard in an easier and cheaper way. In this way, the HD DVD standard would be compatible with the existing standard. Journalists have said that the HD DVD standard can be seen as an ‘upgraded DVD standard’. Nevertheless, Toshiba also claimed that the HD DVD standard was endorsed by the DVD Forum. The BD standard was not compatible with the DVD standard. In addition, in order to achieve greater storage capacity, manufacturers needed to invest in cutting edge production plants in order to produce BD discs. On the other hand, the BD standard had a better copyright protection mechanism (BD+) and greater storage capacity. This was because the development of new consumer electronic products is an existing genre within Sony. Both camps promoted their advantages throughout this standard war, and those advantages reflected their histories and their main business segments.

Table 7.2 Comparison between Sony and Toshiba’s Actions in Legitimacy

Legitimacy	Sony	Toshiba
The main business segments of critical stakeholders	<ol style="list-style-type: none"> 1. It had more number of critical stakeholders than Toshiba. 2. Their main business segments are not only consumer electronic-related but also PC, disc manufacturers. 	<ol style="list-style-type: none"> 1. It had few critical stakeholders in the standard war. 2. Their main business segments are less consumer electronic-related.
The performance of star products	<ol style="list-style-type: none"> 1. According to Sony’s history, it mainly focuses on providing new experience in audio and video-related industries. 	<ol style="list-style-type: none"> 1. According to Toshiba’s history, it mainly focuses on manufacturing of electronics equipment.

Source: Author

7.1.3. Power: Experience of Previous Standard Wars

Besides present the legitimacy, before 2002, Sony and Toshiba also presented that they have power for developing the standards and initiating the standard war. Chapter 5 presents that focal firms can exercise power over the other actors then make other actors believe that the superiority of things provided by them is taken-for-granted (Luke, 1974; Lorenzi, 2006). By using soft power, the institutional entrepreneurs make the audiences believe that they have experience and knowledge required for the new institutions/standard. This section will discuss how the institutional entrepreneurs use their experience of previous standard wars and the networking of stakeholders to make the audiences to believe their actions.

‘Experience’ is defined as practical knowledge and skills which are derived from participation in those events and activities of earlier standard wars which are relevant to the current standard war. It appears that experience can be categorised as legitimacy. However, this study utilizes the conceptualization of ‘soft power’, which assists institutional entrepreneurs to use understanding to influence the actions and behaviours of other social actors. With experience of previous standard wars, institutional entrepreneurs are more capable of understanding which factors are important.

The BD and HD DVD standards were incrementally developed from the previous relevant standards (Sony’s Betamax and Toshiba’s DVD). In these previous standard wars, both companies have learnt the stakeholders’ expectations on the standards of storage device while the stakeholders were well converged as well. Hence, we can define that the storage device industry is a mature industry.

The standard war between VHS and Betamax took place in the 1970s. In early 1971, JVC collaborated with Sony and Matsushita to build a standard for home video. Later, Sony broke away from this collaboration and then began working on their own standard, inventing the Betamax standard in 1974. In general, Betamax had better sound and image quality but only had a capacity of one hour. In contrast, although VHS had poorer image and sound quality, it had a larger capacity than Betamax (two hours of recording time in its original version). Sony believed that their standard was good enough to win this standard war. They also believed that they were ahead of JVC in VCR development, although not in VCR production. Even though they understood this situation, they were “unwilling to compromise on their standard or to help potential licensees with OEM shipments“ (Cusumano, Mylonadis & Rosenbloom, 1992: 70).

In contrast, JVC and Matsushita pursued a strategy intended to form as large a group as possible. They aggressively persuaded other companies to join their project and pursued both licensing and OEM agreements. JVC wished to invite other companies to join the collaboration, and to refine the VHS standard, and so they provided assistance in manufacturing and marketing. Although JVC had less experience making VCRs than Sony, they paid special attention to making its VCR easy to manufacture.

Apart from this alliance, the other incentive designed to attract Hollywood studios was capacity. The studios agreed to produce pre-recorded movie titles for the market. For this reason, by the end of 1978, VHS had a larger market share than Betamax. Although Betamax might have been able to maintain a stable share of the market, it could not generate the network effects of pre-recorded cassette tapes in the early 1980s. The

greater abundance of VHS products and other complementary products gave consumers a much greater incentive to choose the VHS standard, which then led tape distributors to stock more VHS tapes. For this reason, Sony had begun to scale back production of the Betamax standard in some professional areas by 1985. In 1993, Sony and Philips co-developed the MultiMedia Compact Disc (MMCD) and were competing with the Super Density (SD¹¹) disc, which was supported by Toshiba, Time Warner, Matsushita Electric, Hitachi, Mitsubishi Electric, Pioneer, Thomson and JVC. In this standard war, the PC industry was the critical stakeholder for both camps. The SD camp approached IBM, asking for advice about the file system they should use for their disc. At the same time, IBM were also contacted by the MMCD camp and discussed their development project. For this reason, IBM organized a group of companies in the PC industry, including Apple, Microsoft, Sun, Dell and others. This group was referred to as the Technical Working Group. This group urged both camps to become a single, converged standard; if this did not take place, the group would not support either side. In order to avoid another costly standard war in the 1980s, Sony and Philips agreed to unify their

¹¹ According to my Japanese interviewee's response, Toshiba wanted to copy the experience of SD-MMCD standard war to the BD-HD DVD standard war. For Toshiba, the SD standard war is successful. However, in a sense, Toshiba was satisfied in the previous experience and tended to copy the experience. This study suggests that it can be defined as inertia. However, there is no sufficient information in the dataset. Thus, I only can refer to few theoretical studies on the issue discuss it in the footnote.

This study suggests that inertia can be defined as forces which tend to stop organizations from changing despite the pressure on them to do so. It is described as a state of being "rooted in part in the stable standard operating procedures that initiate and govern organizational action" (Stuart, 2002: 629). According to my Japanese interviewee's response, Toshiba may insist on repeating its successful experience of the standard war in the 1990s between SD and MMCD. The inertia in Toshiba was caused by rigid thinking by manager. The inertia initiated by the Toshiba manager. He restricted the company's ability to change when they came under environmental pressure. When organizations are threatened, they tend to become rigid in their thinking and unable to pursue innovative change.

Besides, I suspect that the DVD Forum might also have generated network inertia in the HD DVD camp. Network inertia can be defined as a "persistent organizational resistance to changing interorganizational network ties or difficulties that an organization faces when it attempts to dissolve old relationships and form new network ties" (Kim, Oh & Swaminathan, 2006: 704). Toshiba's network inertia meant that it had rigid inter-organizational relationships with its partners in the standard war. The outcome of this was two events of 2007, the actions of the hacker, and the rebellion by Paramount and DreamWorks. Consequently, this inertia may have intervened in the relationship between collective action and discursive activity, as well as the relationship between Toshiba's actions and their accumulation of resources.

project, choosing to release SD as a single standard. The final specification of this new standard was predominantly the same as Toshiba and Matsushita's SD standard, and was known as DVD (Digital Versatile Disk). The first DVD Video was introduced by Toshiba in Japan in 1996. In this standard war, Sony was defeated by Toshiba, although this was not very costly for them.

Neither Sony nor Philips was convinced by this compromise. They both believed that, because of its CD technology, the MMCD standard was not secure. That is why the disc safety of the MMCD standard was totally different to that of Toshiba's SD and the later DVD standards. In their view, the issue of safety is both basic and critical in a digital era. This is why Sony took the standardization of BD so seriously. The disc safety issue was therefore the main talking point when Sony promoted it to stakeholders, and helped to undermine the HD DVD standard in later collective action and discursive activity.

To summarize, Sony has sufficient experience of earlier standard wars concerning optical storage devices, video recording products and other video technologies. Sony evidently learned from this experience. In 2004, *The Wall Street Journal* reported that Disney were backing the BD standard (McBride, 2004). The report cited a statement from Bob Chapek, President of Disney's Buena Vista Home Entertainment division, and confirmed that Sony had learned from the experience of the earlier war between VHS and Betamax.

7.1.4. Power: Networking

Networking is defined as the practice of making contact and exchanging information with other people. In the standard war, the people were critical stakeholders and core employees. The dataset demonstrated that the concept of networking in the standard war can be divided into two separate ideas: ‘networking with critical stakeholders’ and ‘networking with core employees’.

Firstly, ‘networking with critical stakeholders’ is defined as the degree of direct links, frequent communications and intimate contact which an institutional entrepreneur has with its critical stakeholders. The literature review suggests that by possessing a central network position and social relations, institutional entrepreneurs possess a reasonable amount of power before they initiate a standard war.

Sony and Toshiba are members of the Steering Committee of the DVD Forum. According to the information provided by the Forum, this committee has nineteen members: Disney, Hitachi, IBM, the Industrial Technology Research Institute (ITRI, established by the Taiwanese government), Intel, LG, Memory-Tech, Microsoft, Mitsubishi, NEC, Panasonic, Paramount, Pioneer, Samsung, Sharp, Sony, Technicolor, Toshiba and Warner Brothers. With the exception of the Industrial Technology Research Institute, all the members were highly active in the standard war. The existence of the Steering Committee shows that both Sony and Toshiba engage in a certain amount of networking with their stakeholders.

Besides, the DVD Forum was established in the DVD standard war. The DVD Forum includes many active participants in the DVD standard war, including Sony and Philips. In order to successfully integrate SD and MMCD standards together and well develop the specifications of the DVD standard, these members of the Steering Committee actively well engage in the relevant R&D activities.

In order to exchange opinions and approve decisions about the DVD standard, members of the DVD Forum have one annual general meeting, while the Steering Committee meets three times a year. In addition, there are many informal interactions between the members of this committee. Before 2002, Sony had discussed the future of the DVD standard with many other members of the DVD Forum. This meant that the members of the DVD Forum had two different locations in which to discuss the development of optical storage devices, one in the Sony camp and the other in the Toshiba camp. Initially, when Sony, Panasonic and Philips led the discussion in their camp, Sony had an intensive relationship with Philips, and co-developed the MMCD standard with them in the 1990s. On the other hand, although Panasonic, whose main business segments includes consumer electronics products, supported the JVC VHS standard and beat Sony in the standard war of the 1980s Panasonic was in Sony's camp in the standard war. Thus, before the BD standard was launched, Sony, Panasonic, Philips and many other companies understood each other's interests and opinions about the new standard because of the frequency of their communications in the DVD Forum, and their experience of earlier standard wars. Consequently, the new standards of optical storage device were emerged from these discussions and activities.

‘Core employees’ networking’ refers to the ways in which core employees working in focal firms (Sony, Panasonic, and Philips) can convey information and influence employees of other companies through personal connections. My discussion of this property is based on the interview I conducted in Japan. According to this interviewee, these three engineers not only assisted Sony and its partners to draw up the specifications of the BD standard, but also helped to attract other companies to the BDA.

Sony, Panasonic, and Philips all employed a famous engineer respectively. My interviewee called these three engineers ‘masters’, and told me that their presence was the reason why the BD founders were able initially to create the new specifications of BD standard very quickly, and then to motivate more than seventy BDA member organizations by 2004. This was because many of the engineers in these other companies had been taught by these three ‘masters’. These ‘master engineers’ played a critical role not only on the presenting the power of the BD standard but also on the framing the standard.

Due to the frequency of communications within the DVD Forum, Sony were able to discuss new development and share information with many other companies. This was because they both had positions in the DVD Forum, and so the ideas for new innovations emerged from the discussions they had there. Moreover, the three famous engineers were responsible for developing the specification of the BD standard. The engineers working for these other companies trusted the abilities of these famous engineers, and so Sony, Panasonic and Philips were able to rapidly develop the BD standard (specification v.1.0). Some of the companies which took the side of Sony on

the Steering Committee, together with others which had been influenced by these three engineers, established and endorsed the primary specifications of the BD standard. As a consequence, before the BDA was established, more than seventy companies had either applied for the license and/or joined the BDF.

If they have sufficient experience of previous standard wars, institutional entrepreneurs will be able to understand which tactics should be used in a new standard war. In turn, they can attract more companies to the collaboration. This is because their experience means that they will understand what these other companies will want to achieve in a standard war. Although Sony had lost the earlier standard wars between VHS and Betamax, and between SD and MMCD, they did learn tactical lessons from them.

This study also found that having a network core employees led to the development of specifications and the faster engagement of other companies. This finding shows that it is not only the credibility of institutional entrepreneurs that is critical (Zott & Huy, 2007), but also the influence of their core employees. Furthermore, this study takes the view that institutional entrepreneurs are organizations. Although standard wars and processes of institutional change should be considered at the organizational level, these findings show that the individual level of these processes should also be studied. Furthermore, they also suggest that the importance of human resource management should be taken into account.

Table 7.3 Comparison between Sony and Toshiba's Actions in Power

Power	Sony	Toshiba
Networking		
Networking with critical stakeholders	<ol style="list-style-type: none"> 1. It applied for a number of optical patents co-developed with critical stakeholders between 2002 and 2008. 2. Some other critical stakeholders did not have intensive R&D with Sony but have signal informing the audience. 	<ol style="list-style-type: none"> 1. It applied less optical patents co-developed with critical stakeholders than Sony between 2002 and 2008. 2. It also had some intensive R&D activities with critical stakeholders. They also have signal meanings.
Core employees' networking	<ol style="list-style-type: none"> 1. Sony, Phillips, and Panasonic's three master engineers not only draw up the specifications of the BD standard but also helped to attract prospective organizations to the BDA. 	<ol style="list-style-type: none"> 1. According to the dataset, Toshiba and its critical partners did not have core employees as well as Sony.
Experience of previous standard wars		
Experience of previous standard wars	<ol style="list-style-type: none"> 1. Sony had two previous standard wars: JVC VHS vs. Sony Betamax and Toshiba SD vs. Sony MMCD. 2. Sony lost both wars but learned much experience. 	<ol style="list-style-type: none"> 1. Toshiba had SD standard war with Sony's MMCD. 2. It may want to copy the experience to the BD standard war.

Source: Author

7.2. 2002-2006: Establishing BDF and BDA

Since 2002, both companies established the collaboration (Blu-ray Disc Founder (BDF), it transformed to Blu-disc Association (BDA) in 2004) or used the existing

collaboration (Toshiba's DVD Forum) to employ practices in the collaborations, this study names collaboration structuring capabilities. At the moment, both companies also employed some specialized practices to their critical stakeholders, this study names critical stakeholders management capabilities.

Critical stakeholder management can be defined as the process of managing and responding to the expectations and requirements of critical stakeholders. As well as critical and general stakeholders, I also discovered a different type of stakeholder who do not have direct interests in a standard war, but will influence its outputs. Both the BD and HD DVD parties view the media as an effective channel for the communication of information and the construction of meanings to audiences. However, the work of journalists and columnists may further increase or decrease the influence of standards. In this way, institutional entrepreneurs need skills which make them capable of influencing the messages of the media in a variety of ways. The relevant findings will be discussed below.

Besides, the term 'collaboration structuring capability' can be defined as a process of establishing formal structures and rules, in order to manage effective collaborations in which divergent members exchange and share opinions and resources in order to achieve common goals. Rather than being a specific capability, like communication and R&D capability in a standard war, 'collaboration structuring capability' is a general term which denotes that an institutional entrepreneur should be capable of setting the rules for collaboration in institutional entrepreneurship.

The membership structure of a collaboration needs to be hierarchical, rather than flat (Hardy, et al., 2005). In order to manage collaborations effectively, institutional entrepreneurs establish hardcore groups¹² before the establishment of formal collaborations. Thereafter, they will construct other formal collaborations so that different types of companies can be invited to join. In such processes, institutional entrepreneurs and the groups of critical stakeholders set up hierarchical structures and rules in order to assign different tasks to different members.

Since 2002, both companies actively used these capabilities in the standard war. Analysing the actions of BDA and the DVD Forum in this standard war, I found that many of their critical activities were reported in the media. This encouraged me to find more evidence to explore the relationships between collective action and discursive activities. In this phase, this study not only documents the critical events in sequence but also distills the specific practices of collective actions and discursive activities. However, many different practices were happened at the same time. This reflects that institutional entrepreneurs face different tasks and choose different critical stakeholders to help them to deal with different tasks. Hence, this study will document the critical events in sequence as well as possible.

¹² In the standard war, Sony allied Panasonic and Phillips to establish a hardcore group. Both Panasonic and Phillips are Sony's critical stakeholders in the standard war. They not only have intensive R&D activities among each other but also have common experience in the previous standard wars, including VHS-Betamax and SD-MMCD. In the BD-HD DVD standard war, they co-developed the blue laser technology and co-applied number of patents. In the later analysis, these three companies co-managed the BDA as well. Thus, this study suggests that these three companies allied a hardcore group in the BDA. They are critical stakeholders. They are also capable of initiating issues to the BDA as well.

7.2.1. Collaboration Structuring Capabilities: The Portfolio of the Institutional Entrepreneur¹³

The portfolio of an institutional entrepreneur's can be defined as the set of direct ties possessed by that institutional entrepreneur in a standard war. Toshiba and Sony established different types of portfolios in their standard war. Before it began, Toshiba possessed, as their portfolio, the Steering Committee of the DVD Forum, which is responsible for all official DVD standard specifications. There are nineteen members of the committee, including Sony, Samsung, Philips, Panasonic and many other companies, who form part of the BD camp as well. Toshiba's portfolio has dominated the DVD market for decades. In 2002, Sony led eight other companies in establishing the BDF. Most members of the BDF also had positions on the DVD Forum. Later, in 2004, BDF became the BDA. These founder-members kept their positions on the Board of Directors (BOD) of the BDA, its highest level, which sets an overall strategy and approves key decisions. Members can participate in all its activities and attend all of its meetings. Most importantly, BOD members have the right to approve or reject any decision and suggestion made by its committees.

The BD standard was co-developed by Sony, Panasonic, and Philips. My Japanese interviewee, referred to them as the three facilitators. They were capable of initiating essential issues which could then be discussed in the BDA's annual general meeting. In other words, these three companies were more influential than the other members of the

¹³ In 2004, Sony bought the library of MGM (Metro-Goldwyn-Mayer). In addition, before the standard war began, Sony bought Columbia TriStar and renamed it 'Sony Picture'. These two acquisitions do not have sufficient information from media reports in the dataset. It is difficult to conclude, however, that these deals were done for the benefit of the BD standard. It is also difficult to account the acquisitions in the portfolio of the institutional entrepreneurs. Because, these two studios are accounted for Sony's entertainment department.

BOD. This was because they were not only responsible for initiating issues in annual meetings but were also capable of managing the daily tasks of the BDA.

These three companies have several common characteristics. First, they all have previous experience of standard wars. Panasonic co-developed the VHS standard with JVC and competed with Sony in the 1980s. Philips and Sony co-developed the MMCD standard and competed with Toshiba in the 1990s. Secondly, they are all members of the Steering Committee of the DVD Forum. As part of this consortium, they have regular annual meetings, and often also meet informally. Thirdly, they are all leading companies in the consumer electronics industry, and, to some extent, are competitors. However, they know each other's capabilities and advantages very well. In the DVD Forum, they exchanged and shared ideas about the future of the DVD standard. Thus, they discovered that they had a common goal, in other words, the development of a new standard to replace the existing DVD standard. They later shared this idea with other members of the DVD Forum. Many other companies which were represented on the Steering Committee supported this idea, and then established the BDF. This is why many founder members of the BDF also have positions in the DVD Forum.

The Secretariat of the BDA, the most powerful part of the organization after the BOD, is responsible for the effective management not only of the organization, but also of its collaborations. It consists of five officers: the President, Secretary, Chief Finance Officer, Licensing Officer and Enforcement Officer. These officers are drawn from the three facilitator companies, which means that these three facilitators have the most power in the BDA.

From 2002 to the official establishment of the BDA in 2004, BDF deliberately invited HP, Dell, TDK, a leading manufacturer of recording media, and JVC, who had defeated Sony in the standard war between VHS and Betamax. These companies were all critical stakeholders. Originally, the BDF consisted of consumer electronic companies. These latter invitations made the portfolio more divergent. When the BDA was established, these stakeholders became founder-members of the BOD. Additionally, throughout this standard war, Sony invited many other leading companies to join the BDA and became members of the BOD. According to the journalist, Sony offered incentives to these companies. In this way, Sony attempted to establish a strong and divergent portfolio in their standard war.

Sony attempted to establish a high-performing portfolio in this standard war. They invited companies who have had intensive R&D activity and/or intimate connections with the development of the optical storage device, or opinions about it. Sony, Phillips, and Panasonic manage the entire collaboration. Sony later invited some other leading companies, with weak ties, to engage in the BDF/BDA. In this way, Sony established a portfolio of divergent and leading companies. This type of portfolio also proved to be a source of power and legitimacy for Sony, because many of those companies which had experience of previous standard wars and/or had outstanding products and performance in these fields could then be promoted using discursive activities.

Discursive activity can be defined as “the actor display[ing] or tr[ying] to draw other people’s attention to the meaning of an object or action that goes beyond the object or action’s intrinsic content or functional use” (Zott & Huy, 2007: 70).

Many actions and activities of institutional entrepreneurs have both intrinsic and symbolic meanings. In a broader view, these actions can also be seen as discursive activities. For instance, in the section on collective action in this study, I showed that, in order to respond to the expectations of Hollywood studios about copyright protection mechanism, Sony added BD+ as an additional copyright protection technology. This action can be seen as a tactical response to expectations. As it also constructs meanings, this action also reflects the fact that Sony had a compelling reason for responding to these expectations: the DVD standard had a weak copyright protection mechanism. In this way, institutional entrepreneurs can use not only verbal discourses to communicate information and construct meanings but also non-verbal discourses.

To summarize, this category describes the role and importance of critical stakeholders and hardcore group in standard wars. Institutional entrepreneurs deliberately invite critical stakeholders who have a certain level of relationship with them at the start of standard wars. Institutional entrepreneurs also share power with them as well. According to the information given by the BDA, Sony and a number of critical stakeholders (BOD) determine the direction of entire collaborations. Sony also established a hardcore group, consisting of three facilitators (Panasonic and Phillips), to determine the direction of entire collaboration. These facilitators can be seen as hardcore group members to chair, co-chair, and facilitate the BOD meetings and manage the BDA.

7.2.2. Critical Stakeholder Management Capabilities: Understanding Expectations

‘Understanding expectations’ can be seen as the process of understanding the interests and requirements of critical stakeholders in standard wars. Logically, if institutional entrepreneurs understand the expectations and requirements of critical stakeholders, then they will know how to respond to their requirements. Establishing the portfolios, both institutional entrepreneurs can easily understand these stakeholders’ expectations on the new standards.

In the standard war, both parties promote the idea that their standards are better than those of their rivals. *San Jose Mercury News* reported that Hollywood studios argued that copyright protection should be a critical issue in the development of the new high-definition optical storage device at the beginning of this standard war (Chmielewski, 2004). The protection mechanism in the DVD standard was weak, which meant that content providers were losing millions of dollars a year through piracy. Because of this, Sony agreed that copyright protection should be an essential issue in this standard war.

Based on their experience of earlier standard wars, and their understanding of the problems of the DVD standard, Sony and Toshiba decided to use Blue-laser technology¹⁴ for their standards. According to the media, Toshiba simply viewed the HD DVD standard as an ‘upgraded DVD standard’. Toshiba wanted to keep the leading position in the field of optical storage devices. As a result, they decided to lower their production costs in order to convince stakeholders to adopt the HD DVD standard.

¹⁴ My Japanese interviewee told me that blue laser technology was not developed by Sony or Toshiba but by a small company called Nichia. This company is run by a famous engineer, who invented blue-laser technology. For reasons yet to be uncovered, Toshiba and Sony obtained the technology.

However, Toshiba ignored the fact that, by using cutting edge manufacturing processes, many firms which sell manufacturing equipment can also benefit from a standard war, even though manufacturers and Hollywood studios incur greater costs because of the need to upgrade.

Furthermore, my Japanese interviewee was of the opinion that Sony still believed that the copyright protection technology of its MMCD was better than those of the SD and DVD standards. However, Toshiba ignored Sony's opinion in that standard war. At the beginning of this standard war, copyright protection was not a critical issue. However, as a result of the engagement of a large number of companies in the BDA, and that of Hollywood studios in particular, Sony were able to confirm that safer copyright protection technology was a requirement of Hollywood studios. For this reason, Sony not only adopted A.A.C.S. (the Advanced Access Content System) but also developed BD+, and promoted it using discursive activities. As a consequence of their experience of previous standard wars, Sony realized that copyright protection was a key expectation of their stakeholders. This was despite the fact that both Sony and Toshiba were using the same Blue-laser technology.

7.2.3. Discursive Activities: Framing

'Framing' is defined as the use of various verbal and non-verbal discourses to construct the identification and expression of a novel understanding of a problem, and to explicitly provide compelling reasons to support the new vision being promoted. In institutional entrepreneurship, using framing processes offers legitimating accounts of the new standard being promoted. Institutional entrepreneurs need to highlight the

problems within current institutions and to provide their audiences with solutions in the beginning of the standard war.

Before discussing the framing strategies of both Sony and Toshiba, this study will discuss the ways in which they attracted the attention of media before this standard war. My finding was that their framing strategy was similar to a combination of their power and legitimacy. Both organizations had their own collaborations, and experience of previous standard wars. Because of this, their new standards rapidly won the attention of the media. In order to further identify their relationships, I collected additional data sources in order to triangulate the viewpoint.

Firstly, my finding was that production costs, copyright protection and capacity issues were linked to the comprehensiveness of their main business segments and those of their partners¹⁵. Sony had more divergent partners in their camp (see Table 7.1). This shows that the BD standard was endorsed by many other leading companies in the industry. Although consumer electronic products were not the main segments of some of these companies, the others provided complementary capabilities and therefore strengthened the BD standard further.

Secondly, this study found that Sony's actions did not feature in media reports between 2002 and early 2004. However, these actions were very important for the standard. There is always a 'time lag' effect between the launch date of new standard and the first media report about it. According to the dataset, the first media report of this standard

¹⁵ The issues being framed in the standard war was related to institutional entrepreneurs and critical stakeholders' main business segments. These segments present that these organizations have specific pragmatic legitimacy for the standards. Table 8.9 has a clear comparison between two camps.

war was on *EBN* on 2 September 2002, while the official BD website shows that the launch date of the BD standard was 20 May 2002. This time lag lasted for four months. The dataset includes only three media reports about this standard war, two on *EBN* and one in *The Economist*. By 2004, there were many more media reports about the activities relevant to this standard war. There are two possible explanations for these findings. Firstly, they show that even institutional entrepreneurs and their partners can be central players in relevant industries, it may be difficult to attract media attention, communicate information and construct meanings to the audience. In this case, which factors gave rise to the most media reports? Alternatively, we may find that institutional entrepreneurs may have acted in ways which have not been reported in the media. If that is so, what were their actions in this period?

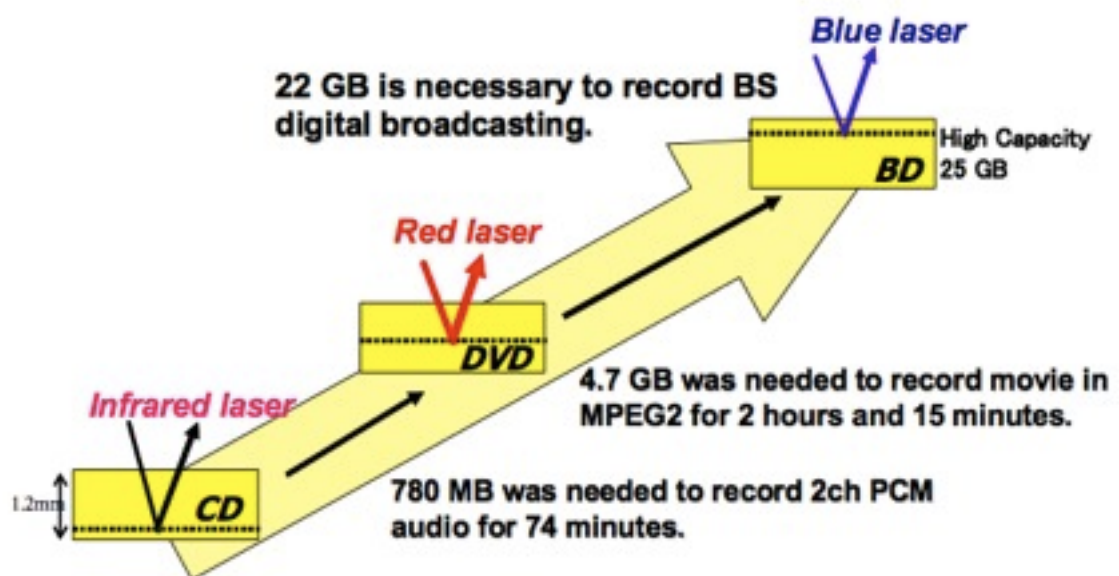
One potential explanation could be that their actions simply could not attract the attention of the media. Alternatively, the explanation might be that their actions were in some way secret. This might be due to the BDF's announcement in 2004 that they had launched the BDA. The original group of BDF founder-members increased from nine to thirteen when HP, Dell, TDK and JVC all joined. All the members of the BDF transferred to the BDA. Interestingly, when the BDA was launched, the association included more than seventy members of the BDF. Why was this the case? Were their actions during these two years simply unable to attract the attention of the media, or was there another reason? This question formed a central part of the interview I conducted in Japan. The one of the answers is, Sony, Panasonic, and Phillips all employed a famous engineer respectively. These famous engineers was the reason why the BD founders were able initially to create the new specifications of BD standard very quickly.

Aside from the issue of ‘masters’, both camps used various discourses in their standard war to frame the problems of DVD standards and to find solutions to them. These discourses included media reports, their own official technical reports and so on. In order to make their strategies more comprehensible, I will now give a short overview of the development of high-definition television. In the early 21st century, sales of LCD and Plasma televisions demonstrated steady growth. High-definition television sets (HDTV) derived from the integration of ultra-high 2160 pixel resolution technology, which showed an increase from the current 1080 and 720 pixels. Compared to the traditional RGB (Red, Green, and Blue) pixel technology, HDTV utilizes an additional, color, yellow. Moreover, 2160-pixel screens can be divided into a maximum of four separate displays, each of which has 1080-pixel resolution. In other words, in the era of HDTV, consumers can enjoy a wider range of entertainment from their televisions and relevant complementary products. As a result, the number of households in Europe with HD-enabled television sets has grown from 59 million in 2008 to 116 million in 2010. By 2018, this figure may reach 220 million. The number of HD channels distributed in Europe also more than doubled to 130 in 2008, and by 2013 there could be more than 600.

Many consumer electronic companies predicted the trend towards HDTV and its potential future economic value. After the establishment of the first BD specifications, the BDF used a framing strategy towards its audiences. Figure 8.5, which cites the White Paper of the Blu-ray Disc Format, demonstrates that the capacity for growth of consumer optical discs evolves naturally. The BD camp gives as an example that the traditional audio CD format can only hold 74 minutes of content, and the DVD format

only holds 2 hours and 15 minutes of video content in the MPEG-2¹⁶ format. The BD camp suggested that in the HDTV era, its standard would be able to record 22 GB of digital content. The storage capacity of BD is almost five times the size of the DVD standard. Later, the vast majority of media reports contrasted the similarities and differences of the BD and HD DVD standards.

Figure 7.1 The Revolution of the BD Standard



Source: The White Paper of Blu-ray Disc Format

In contrast, Toshiba and NEC co-developed a new standard, based on the same technology (blue-violet laser). The primary HD DVD standard had the 0.6mm disc layer used in the current DVD red laser standard (whereas the BD standard had a 0.1mm disc substrate). They claimed that DVD makers could alter their production equipment much more easily and, cheaply, and bring the product to market much earlier. However, this new standard player was only capable of reading discs with 10% to 25% less density than a BD product (and the original capacity of BD standard was 23 GB).

¹⁶ MPEG-2 describes a combination of audio data compression and loss video compression methods which allow the storage and transmission of video content.

Both camps framed the capacity issue in order to solve one of the problems of the DVD standard, its smaller capacity. In the standard war, this issue was not the only one which was framed by both parties. This was also the case with copyright protection. In the dataset, these issues of capacity and copyright protection were presented not only in framing but also in other discursive activities. At the beginning of their standard war, Sony tried to point out another problem of the DVD standard, its weak copyright protection mechanism. This study found that the reason why Sony used the issue as the main framing strategy was their experience of the earlier standard war between Toshiba SD and Sony MMCD. According to my Japanese interviewee, this was because Sony believed that the copyright protection of its MMCD was better than that of Toshiba's SD. Unfortunately, the MMCD standard was then integrated with Toshiba, which weakened it. In this way, Sony, together with Philips, which co-developed MMCD with Sony in the 1990s, wished to further highlight the importance of the copyright protection issue in the digital era.

The DVD standard is easily hacked into. Its weak copyright protection mechanism means that Hollywood studios lose millions of dollars every year from pirated DVDs (Belson & Sorkin, 2004). In order to strengthen this technology, the BD standard adopted not only A.A.C.S. but also another technology, BD+. In the section on collective action, developing new copyright protection technology was shown to respond to the expectations of critical stakeholders. In discursive activity, development is led by the framing strategy, which provides compelling reasons to support the BD standard. In addition, the analysis in this section has also shown that this framing

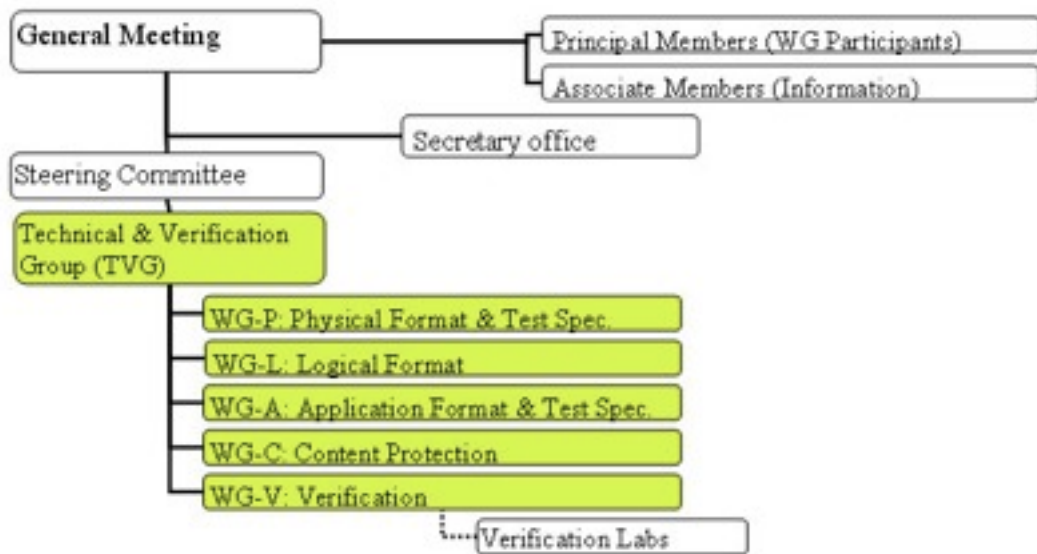
strategy is close to the experience of institutional entrepreneurs in the earlier standard war. This idea will be discussed further in the section on power.

7.2.4. Collaboration Structuring Capabilities: The Structure of Membership

According to the Collins English Dictionary, the term ‘member’ refers to a social actor who belongs to a club or association. ‘Membership’ can be defined as the collective members of an organization. A structure of membership is a set of rules which explicitly defines the responsibilities and obligations of all the members of a collaboration. In processes of institutional change, institutional entrepreneurs may face social actors who have fewer networking capabilities or intentions, even including free riders (North, 1990). In turn, institutional entrepreneurs need a hierarchical membership to formalize the roles of members. These findings also reflect the evidence of the mission statements presented in Chapter 5.

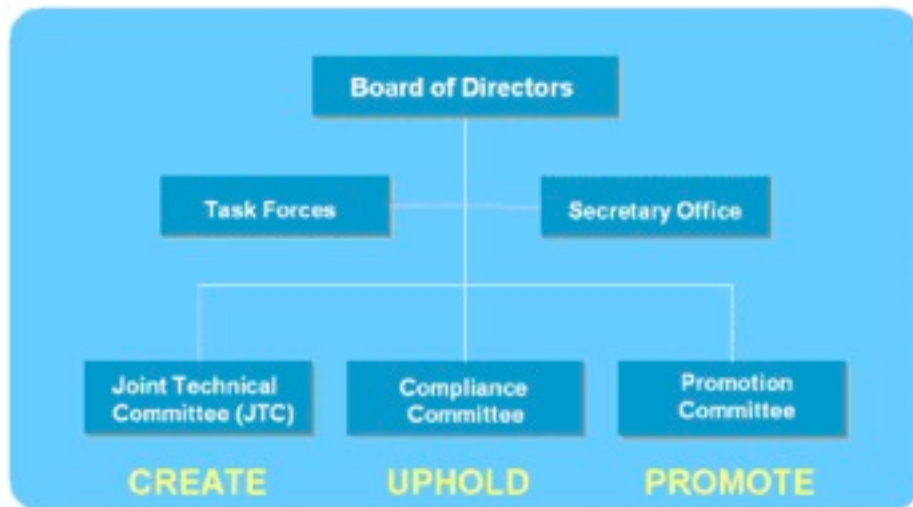
Both Toshiba and Sony established a hierarchical membership to formalize the obligations and responsibilities of members. Both collaborations have established several sub-groups, each of which is responsible for a different task. However, I have been unable to obtain more detailed information concerning the DVD Forum. As a result, my analysis will focus on the BDA. Figure 8.3 and 8.4 present the hierarchical membership structures and divisions of these two collaborations. Furthermore, according to a BDA by-law, member organizations at different levels have different responsibilities and obligations.

Figure 7.2 The Structure of Membership of the DVD Forum



Source: DVD Forum

Figure 7.3 The Structure of Membership of the BDA



Source: BDA

Only some members of the BDA can freely join these committees or sub-groups. General Member is the lowest level, and provides access to specific information from discussions of the committee. Companies at this level can attend general meetings and

seminars, and can also participate in activities of specific regional promotion teams and of the Compliance Committee.

A more advanced level of membership is that of Contributor. Companies at this level are active participants in the creation of formats, as well as other key activities of the BDA, and can also be elected to the Board of Directors. They not only have the rights of General Members, but can also participate in Technical Expert Groups and most of the Compliance Committee activities. Their membership requires the execution of a Contribution Agreement and must be approved by the Board of Directors.

Finally, the Board of Directors is the highest level of the BDA. Companies at this level are active participants in the format creation and other key BDA activities. These members are elected from among the Contributors. The BOD sets an overall strategy and approves key issues. Its members can participate in all activities and attend all meetings. The initial BOD was made up of BDF members. The BD standard was co-developed by Sony, Matsushita and Philips, who were the main facilitators of the BDA, and were capable of initiating essential issues which could be discussed at the annual meeting of the BDA.

Like the Secretariat, which was discussed in the foregoing section, the task force team was not established at the time of the standard war. It was formed in May 2009, according to the BDA by-law v. 1.9, and was responsible for developing 3-D technology to the BD standard. It was made up of members from the film, consumer electronics and IT sectors.

The BDA is able to fundamentally differentiate members into different levels. By differentiating the membership fee, it is also able to recognise those firms which are willing to give more to the collaboration. To summarize, this section has presented the guidelines of membership structure and mission statements in collaborations.

7.2.5. Collaboration Structuring Capabilities: Product Development Activities

Product development is a specialized activity. It is done to improve the existing product or to introduce a new product in the market. It is also done to improve the earlier features or techniques or systems. Although both camps did many R&D activities in the standard war, they put much effort on improving the existing features of the new standard and integrating the standard and the products and complementary ones, for example, Sony PlayStation 3 (PS3).

Both parties had similar committees or sub-groups which were responsible for researching, developing and testing new technologies and specifications for their standards. These were the critical tasks for both collaborations. Their importance was also reflected in the structure of the collaborations. The DVD Forum set up a Technical and Verification Group (TVG) and other relevant sub-groups and labs, while the BDA set up a Joint Technical Committee (JTC) and a Compliance Committee (CC) to create, develop and test new innovations to the BD standard. According to the BDA by-law v. 1.9, the JTC coordinated and accelerated technical discussions in or among Technical Expert Groups¹⁷, as well as submitting technical proposals to the BOD for approval, and presenting the technical viewpoint of the BDA, along strategic guidelines determined by

¹⁷ There were five Technical Expert Groups in the BDA: BD RE physical specification, AV application, BD ROM physical specifications, BD R physical specifications, and file system and command set.

the Promotion Committee. Moreover, in order to guarantee a consistent experience for end-users, the Compliance Committee ensured the compatibility and interchangeability of all BD products. It also supported fast and broad acceptance of BD standards in relevant industries. There are three sub-groups in this committee. Firstly, the Test Specification Group was responsible for the development of test specifications and testing methods, while also approving testing tools and distributing reference discs. Secondly, the System Compatibility Group was responsible for conducting round robin compatibility tests and recommending preferred implementation in order to achieve industry consensus. It was also responsible for the development of a Compliance Committee newsletter to inform members about compliance-related issues. Thirdly, the Verification Service Group was responsible for ensuring alignment between the different test centers, defining the logistics and technical procedures of those centers, and organising market inspections in order to maintain product quality.

According to the limited media reports and information available to me, the product development activities of the DVD Forum were less intense than those of the BDA. This is because, firstly, Toshiba did not successfully integrate its product with the Microsoft Xbox 360, whereas Sony did. Using the PS3 was a risky decision for Sony. This was because the Cell processor and BD players were at that time cutting edge technologies. If the PS3 had been unable to seed the BD players into markets or successfully integrate them with BD players, Sony would lose at the same moment both its game consoles business and the standard war. However, that was not the case, and it was successful. On the other hand, according to the dataset, Toshiba did not try to integrate the Xbox 360 with HD players, but provided an additional HD DVD drive costing \$199. Choosing the wrong strategy in this way meant that the final price of the

Xbox 360 was greater than that of the PS3. Although the launch date of the Xbox 360 was almost a year earlier than that of the PS3, it did not provide a big push for the HD DVD players. As a consequence, the BDA were able to successfully integrate the PS3 and the BD standard. Since 2006, the PS3 acted as a Trojan horse in its standard war. That meant that, consumers buying PS3s also became consumers of BD players. Furthermore, the BD standard was also able to increase its network effects by using the network effects of game consoles. In this way, effective collaboration did indeed lead to network effects.

The second reason is BD+. Initially, although both the BD and HD DVD standards adopted the A.A.C.S. encryption mechanism, the BDA used an additional software-based component that made it possible to modify the copy protection scheme of new discs if the old system was penetrated by hackers. This technology had not been developed by BDA, but the BDA decided to integrate it into the BD standard. It was based on an approach pioneered by a group of technologists at Cryptography Research in San Francisco as a safeguard in the event of the compromise of A.A.C.S. According to a report in *Wired*, the BD+ was originally used to respond to the expectations of 20th Century Fox concerning copyright protection. Later, this technology did perform well when the HD DVD player was hacked. As this shows, effective collaboration in R&D activities can lead to network effects and product performance in a standard war.

To summarize, both parties in a standard war see their collaborations as professional associations. In order to create, theorize and test new innovations for commercial exploitation, such collaborations establish a number of responsible committees or sub-groups. Moreover, effective product development activities can also lead to network

effects and product performance. To some extent, the outputs of product development activities result from the power and legitimacy of institutional entrepreneurs. In a standard war, institutional entrepreneurs can also use these outputs as discursive activities. This view will be discussed in the section on discursive activities.

7.2.6. Collaboration Structuring Capabilities: Frequent Communication

Frequent communication is defined as the formal communications which institutional entrepreneurs engage in with members in collaborations, in which they exchange opinions, share information, and approve decisions. Due to data limitation, I am unable to access the BDA discussion forum and so, for the purposes of this study, frequent communication will only denote formal communication.

The role of communication has been discussed in many studies of networks and strategic alliances. It is a human activity that creates relationships and links members together in collaborations (Mishra & Mishra, 2009). Moreover, the word ‘frequent’ means that collaborations should establish rules that ensure that members have regular formal meetings each of which is at the same time and place.

The BDA uses general meetings to ensure that formal communication takes place frequently. By using general meetings, many official decisions are approved (including those concerning the development of technologies and promotional plans). According to the BDA’s bylaw v.1.9, it has clear regulations about the annual general meeting. This meeting will be held once a year at a time decided by the BOD. The meeting will be announced in writing by the Secretary to all member organizations at least thirty days

prior to the scheduled meeting date. This means that, in practice, the BDA has four general meetings per year, each of which is scheduled for a weekday.

At each general meeting, the BOD gives a report summarizing the activities of the BDA during the period since the last meeting, together with a plan for the next round of activities. All members are entitled to attend these meetings and participate in them. The President of the meeting is one of the three facilitators. The meeting generally approves or makes decisions on (1) the annual membership fees proposed by the BOD; (2) the annual statement of accounts for the BDA, which is submitted by the BOD; and (3) the annual budget of the BDA, which is prepared by the BOD. Moreover, my interviewee also told me that the Secretariat and other committees also have telephone meetings as well as their face-to-face meetings. In this way, frequent communication also plays a critical role in the collaboration. Institutional entrepreneurs need to define very clear protocols for these formal meetings.

By using such formal communications, Sony have fostered both commitment to the collaboration and a desire to participate in it. Moreover, the existence of frequent, recurrent formal communication can reinforce trust among members who face dilemmas concerning collective action (Raymound, 2006); can encourage participation amongst participants in collective action (Imperial, 2005); and can reduce the costs of transactions.

7.2.7. Critical Stakeholders Management Capabilities: Responding to Requirements

‘Responding to requirements’ refers to the process in which the institutional entrepreneur takes actions to respond to the expectations of critical stakeholders. This category not only relates to ‘understanding expectations’ but also to the product development activities of institutional entrepreneurs in collaborations. In the standard war, in order to satisfy these requirements of critical stakeholders, institutional entrepreneurs need to invest resources in product development activities. The results are used to respond to the requirements of critical stakeholders.

For instance, in the standard war under discussion, both parties adopted A.A.C.S. as the main copyright protection mechanism in their standards. However, in 2005, Toshiba announced that Microsoft had joined the HD DVD camp. Later, Toshiba and Microsoft jointly announced that the HD DVD standard would use a managed copy system. In other words, when using HD DVD players, customers would be able to copy disc content on to their PCs, and then share it through home networks. As a result of this, content providers could not fully protect their content. On the other hand, in order to obtain the support of 20th Century Fox, the BD party announced that they would add BD +¹⁸ to the BD standard. In other words, the BD standard not only has the AACCS mechanism but also BD+. This announcement proved to be a way of also instilling confidence into many other Hollywood studios.

¹⁸ Adopting managed copy system for the HD DVD standard and BD+ for the BD standard seems the institutional entrepreneurs respond the critical stakeholders’ requirements. It also can be seen that the internal group members have enhanced their commitment by developing these specifications. Although internal group members are one of audience in institutional change processes. Their actions present that they have received the information in collaborations.

Moreover, when different stakeholders have conflicts of interest, these conflicts may force institutional entrepreneurs to stand aside or make compromises. If the decisions of institutional entrepreneurs conflict with the expectations of powerful stakeholders, there may be negative consequences for institutional entrepreneurs.

An organization may face different types of pressures from its stakeholders, like Toshiba faced two different pressures from Microsoft and Hollywood studios in this case. Toshiba chose Microsoft's but tended to ignore the Hollywood studios'. The response led to serious negative consequences for participants in the standard war. By contrast, BD camp chose Hollywood studios side in BD+ case¹⁹. In order to present the importance of responding powerful critical stakeholder's requirements, this section will further discuss the event of Microsoft's engagement in HD DVD camp.

The engagement of Microsoft was a critical event in this standard war. For Toshiba, Microsoft was a critical stakeholder. Understanding the process and strategies of this

¹⁹ There is an increasing focus on the interaction between institutional pressures and organizational responses (e.g., Oliver, 1991; Pache & Santos, 2010). Institutionalists define situations with such multiple institutional pressures, as characterized by 'institutional complexity' (Greenwood et al., 2011), referring to the number of logics and the degree of incompatibility between them. Organizations face institutional complexity when they confront incompatible prescriptions from multiple institutional logics (Greenwood et al., 2011).

Pache and Santos (2010) indicate that Oliver's (1991) model lacks predictive power when discussing responses to conflicting demands, in particular. They believe that organizations sometimes face a dilemma. In the sense that satisfying one stakeholder's demand may violate others (Pfeffer & Salancik, 1978).

Greenwood et al. (2011) argue that mature fields are more settled and stable than emergent fields. This is because mature fields have a dominant logic which is not often the case with emergent fields. In mature fields, organizations are able to 'predict' the demands from institutions. Hence, in this situation, organizations should be better able to strategically respond with appropriate practices.

In the digital era, content providers pay much attention to copyright protection technology. In turn, the protection can be viewed as the dominant institutional logic in the field. The predictability as an effect of established institutional logics can be expected to enable institutional entrepreneurs to learn how to respond and mitigate the challenges of institutional complexity. This study shows that by responding to the demand from a dominant institutional logic (copyright protection) in a mature field in an appropriate way (providing safer technology), institutional entrepreneurs (Sony) can obtain rewards (the victory of standard war).

event, we can demonstrate the consequences when the intentions of institutional entrepreneurs conflict with the interests of the most critical stakeholders. In order to understand what happened and its consequences, I collected relevant data from Datamonitor and Euromonitor, and analyzed relevant media reports.

In 2005, Microsoft announced that it would support the HD DVD standard, and that its Vista operating system would also exclusively support the standard. Microsoft is undoubtedly an extremely powerful part of the PC industry, so that, even though Vista did not gain market approval, this operating system and its predecessor, XP, have dominated the market for operating systems, with a share of almost 90% in the period immediately before the launch of Windows 7.

Microsoft had themselves planned to dominate the home entertainment market. According to the *Euromonitor* database, in the United States, in-home consumer electronics (In-home CE)²⁰ shows steady growth in the category of consumer electronics (CE)²¹. The database shows a similar trend with regard to computers and peripherals²². Moreover, the growth rate of in-home consumer electronics is sharper than that of computers and peripherals. Figure 7.4 illustrates the relevant trends in the United States from 2004 to 2009. It shows that the size of the market for in-home consumer electronics increased significantly in 2007. This increase was, in general, the result of the launch of Wii in November 2006, together with the launches of Xbox 360 and PS3 in 2007. However, except the in-home CE, the other two categories do not

²⁰ In-home consumer electronics consists of home audio and cinema, televisions, projectors and video players.

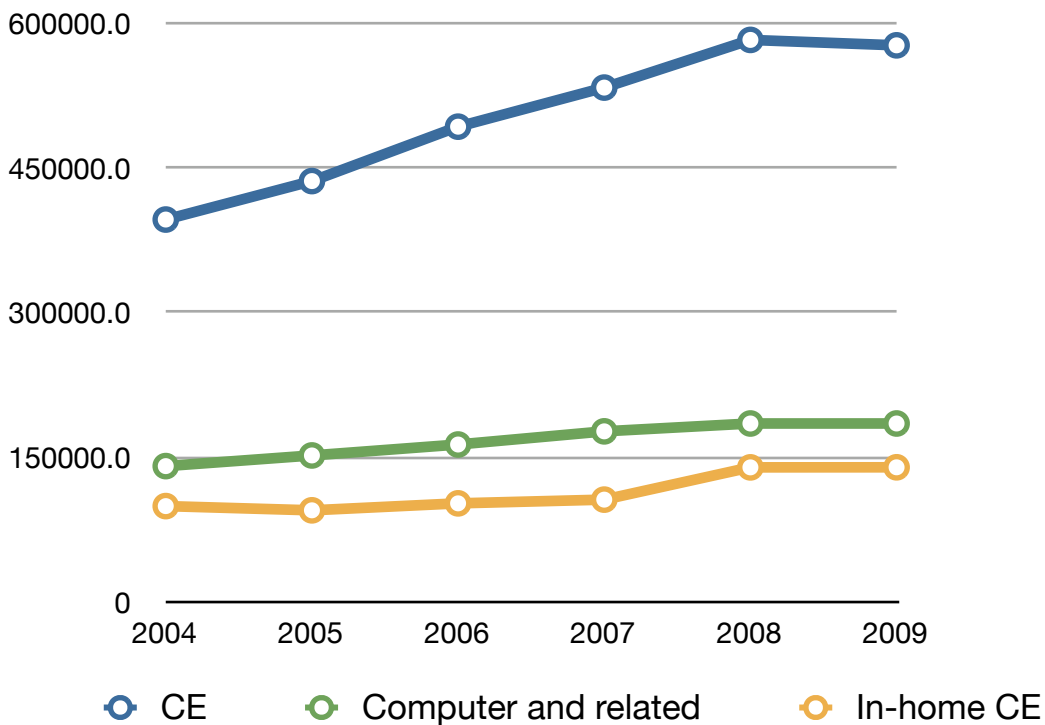
²¹ Consumer electronics refers to sales of computers, as well as peripherals, in-home consumer electronics, in-car entertainment and portable consumer electronics to the end consumer.

²² Computers and peripherals includes desktops and portable computers, as well as peripheral electronics which are designed for use in conjunction with them.

have significant growth from 2004 to 2009. Instead, consumer electronic goes slightly down from 2008 (582,635 thousand unit) to 2009 (577,021 thousand unit).

Figure 7.4

Changes in the Size the Consumer Electronics Market in the USA between 2004 and 2009 ('000 units)



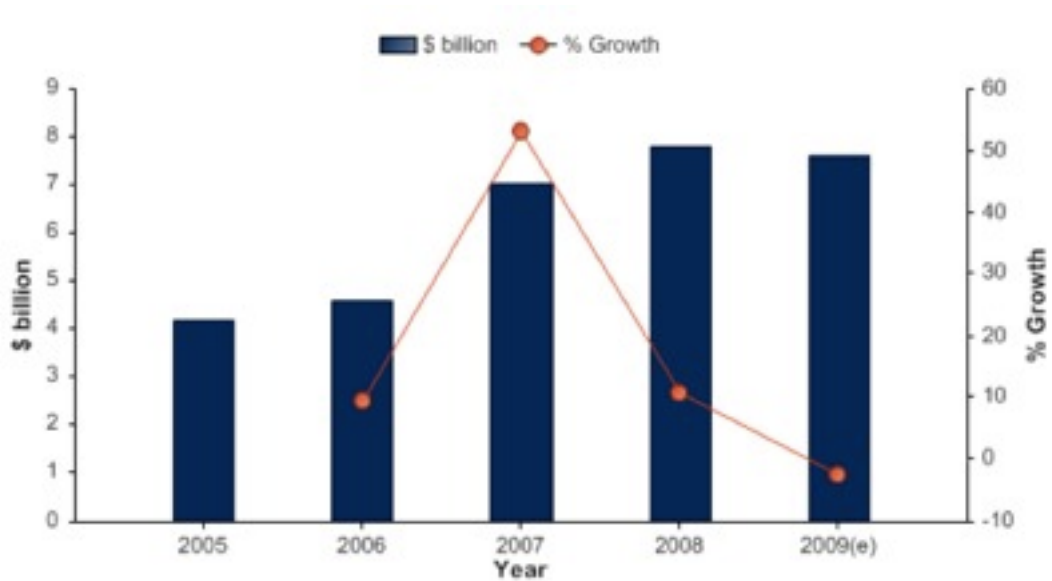
Source: Euromonitor

Figure 7.5 (from Datamonitor) also shows that the increase of the last figure in 2007-2008 may have mainly derived from sales of game consoles. According to Datamonitor’s report, *Games Consoles in the United States*, after the launch of the Nintendo Wii²³, market value in the US reached over 7 billion units a year. However, in Datamonitor’s another report, *PCs in the United States*, comparing to the PC market in

²³ Wii was Nintendo’s fifth home console. It broke the US record for the highest sales of a console in a single month. Wii uses a wireless controller, the Wii Remote, which can be used as a handheld pointing device and detects movement in three dimensions. It also enables users to receive messages and updates over the internet.

the US, although the value of this market was 45.9 billion units in 2009, it had shrunk by 8.6% in 2008.

**Figure 7.5 The Sales and Growth Rate of Game Consoles in the USA
between 2005 to 2009**



In this way, we can more easily see that Microsoft rightly considers game consoles and the home entertainment industry to be its areas of opportunity. This also explains why Microsoft has been a part of the video game console industry since 2001. Its first game console, Xbox, was released in the United States in November 2001²⁴.

Microsoft's domination of the PC market suggested to them that their best strategy was to allow users to copy disc content onto their own computers and home networks, which would have further boosted the market value of these products in the PC industry. There is no evidence to show whether Microsoft had made contact with the BD camp before

²⁴ The United States is the biggest market in the world for both films and consumer electronics. Its games console industry, however, is slightly smaller than Europe. In this section, therefore, relevant market figures are based on those of the US.

evolving this strategy. However, it suited Toshiba's DVD standard. It therefore seems that Toshiba copied the standard DVD experience in its HD DVD standard, and then made the joint announcement, without considering the expectations of content providers. This, therefore, is the reason for Toshiba's alliance with Microsoft, as, with Microsoft's support, Toshiba could use the Xbox 360 to win players of those games, as well as other audiences.

According to *The Wall Street Journal* reports, once Vista exclusively supported the HD DVD standard, other PC companies incurred higher costs because they were forced to install BD drivers into their PCs using the Vista system. However, the PC is an open structure. The open structure provides the possibility of a modular construction model where everyone designs for everyone on the basis of one shared structure. Everybody can contribute parts, components and structures. So there are methods of minimizing the impact of the Vista system. Toshiba did not gain much benefit from allying themselves with Microsoft, because BD camp could utilize the open structure characteristic to minimize the impact. Therefore, but only succeeded in coming into conflict with the expectations of Hollywood studios. As a result, after this announcement, many of these studios said that they would non-exclusively support the BD standard. This had negative consequences for Toshiba.

7.2.8. Discursive Activities: Promoting

After establishing the collaboration in a certain extent and framing the new standard, the institutional entrepreneurs needed to use promoting strategies to increase the likelihood

of its adoption in order to ensure that the new institution is rapidly adopted by its audiences.

This study defines ‘promoting’ as giving publicity to a standard, collaboration and/or in order to increase its sales, adoption and awareness among the public. In the standard war under discussion, both parties used media discourses, conferences, technological exhibitions and other products to seed their standards into customer’s homes.

Firstly, the promoting strategy in the standard war was used to ensure that the standard was legitimized by critical stakeholders. At the time of Microsoft’s engagement in 2005, Toshiba used it to promote the idea that the HD DVD standard was endorsed by Microsoft and its forthcoming Vista operating system. At the beginning of this standard war, Sony announced that it was leading a group of eight other companies to establish BDF, in order to design the BD standard and diffuse it around the world. In their announcement, Sony intended to promote the idea that the BD standard had the endorsement of these leading companies. Later on, the BDF also announced that HP, Dell, TDK and various other companies had joined the BDF. To some extent, these announcements not only announced their portfolio, but also promoted the BD standard as a legitimate one in order to influence the awareness of the public and other stakeholders.

The BD camp also used promoting to place the number of BDA members in media reports. In October 2004, the official site of the BDA announced that they had seventy members. In February 2005, the number of members exceeded a hundred, while in October 2005, it passed 150. Toshiba also attempted to invite companies to engage in or

exclusively support the HD DVD standard. For example, in 2007, Paramount and DreamWorks announced that they would join the HD DVD camp and no longer support the BD standard. This suggests that promoting the engagement of stakeholders implies that rival standards will no longer receive the support of stakeholders. In addition, this strategy demonstrates the critical role played by legitimacy in this standard war.

Secondly, the promoting strategy was used to promote compelling reasons to the audience. After framing the production costs issue in the HD DVD standard in 2004, Toshiba further announced that, jointly with Memory-Tech, it had developed a production line that could make both HD-DVD discs and DVDs, taking only five minutes to switch between the two. Toshiba claimed that this dual-purpose equipment would make it easier for disc manufacturers to produce both DVD and HD DVD discs. In 2005, after Lionsgate had announced that it would join the BDA, the BD camp claimed that, although BD discs were initially likely to be expensive, production costs would fall in the years to come. Hollywood studios sell tens of millions of DVDs every year, so even a difference of a few pennies in the cost of the disc manufacturing process can eat into profits. Cheaper production costs allow studios to permanently lower the retail price of discs. The issue of production costs was the most important advantage in the HD DVD camp at the beginning of this standard war. As more and more studios became engaged with the BD camp, Toshiba was progressively losing its advantage. As a consequence we can see that promoting compelling reasons in this way does not only respond to the questions and expectations of stakeholders, it also makes other stakeholders aware of these reasons and motivate them to take action.

Thirdly, the promoting strategy is also used to promote end products. In the standard war, both camps used game consoles and players to promote their standards. The promoting strategy in this stage was mainly intended to increase the network effects of their standards. In the case of BD, the BDA decided that the PS3 would be integrated with BD players. Its predecessor, the PS2, handed a very large installed base to the PS3. So long as gamers would want also to buy the PS3, the millions of PS3s sold would seed the market for BD players, providing huge economic scale and performance for Hollywood studios, which are generally reluctant to back two rival standards. In addition, Sony needed PS3 to help it maintain its dominance of the game console industry in the emerging market for internet video downloads (*The Economist*, 2006). When the PS3 was launched, Sony faced stronger competition than it had done when it launched the PS2 in 2000. The PS2 gave Sony 70% of the game console market, equivalent to 100 million units. However, the PS3 faced competition from the Microsoft Xbox 360 and the Nintendo Wii. In the case of HD DVD, although Toshiba used the Xbox 360 to promote the HD DVD standard, they did not integrate the two technologies, as was the case with BD and the PS3.

As well as games consoles, both camps used their disc players and PCs to promote the standards. Both of them focused on early adopters. Early adopters can help focal firms to promote their standard using personal, word-of-mouth communication which then generates network effects. Focal firms can also collect feedback from these adopters. This is why Sony and Toshiba used the PS3 and PCs to promote their standards. PC users, gamers, videographers and other interested parties were important early adopters in this standard war. The *Wall Street Journal* suggested that PC users were good early adopters. Bob DeMoulin, marketing manager for Sony, responsible for BD and other

optical media products, also pointed out that millions of HD televisions were already in the market and predicted that 50% of all televisions sold in 2006 would be HDTVs.

Both camps therefore used a promoting strategy to promote their standards, products and compelling messages to their stakeholders and consumers, but achieved different outcomes in their standard war. Firstly, they used this strategy to promote the idea that their standards were both legitimised and endorsed by critical stakeholders. Using the strategy not only communicated the power and legitimacy of their standards but also showed that the influence of their collaborations was becoming stronger. In other words, using discursive activities is also a way of demonstrating collective actions. Secondly, they used this strategy to provide practical solutions, something I discussed in the section on framing. However, Sony tried not only to demonstrate the growing number of BDA members, but also to imply that the main advantage of HD DVD, lower production costs, had been undermined. In other words, this promoting strategy was combined with other strategies to form the discursive activities of this standard war. Thirdly, they used the strategy of using game consoles to promote disc players. My analysis also implies that different outputs of collaborations may lead to different promoting strategies.

7.2.9. Discursive Activities: Undermining

The study defines an undermining strategy as the active use of discourses to implicitly or explicitly erode or impede the base of a rival's standard or collaboration. In this standard war, the institutional entrepreneurs were more likely to use an undermining strategy in an implicit way. The definition also shows that the target being undermined

is not only the standard but also the collaboration. According to the *Collins English Dictionary* (1995), the meaning of ‘undermine’ is to insidiously weaken something. In this standard war, many discursive strategies formed part of the undermining strategy. There is less evidence in the dataset, however, to show that either the BD or HD DVD camps strongly undermined their rival’s standard.

The engagement of Microsoft was a critical event in this standard war, and Toshiba used it as the basis of an undermining strategy. However, this action also gave the BD camp an opportunity to undermine Toshiba. It not only caused the BDA develop the BD+ technology to attach additional copyright protection to the BD standard but also forced critical stakeholders to choose a specific standard to support. This section of the study will further demonstrate that the engagement of Microsoft caused the BD camp to explicitly use an undermining strategy to erode the legitimacy base of HD DVD standard.

Microsoft and Toshiba announced that, as part of their collaboration, they would allow users to copy disc content onto their PCs and home network using iHD. The iHD technology was a interactivity format developed by Microsoft for the next generation of DVDs. The companies used it for interactive services, as well as a feature called ‘managed copy’, which allows users to copy films on to PCs and other devices. This engagement and announcement did put pressure on some PC companies in the BDA, because Microsoft is close to having dominant power in the PC market. Once the Vista system had started to provide exclusive support for the HD DVD standard, other PC companies which supported the BD standard had to pay additional costs to install BD players in their PCs. For this reason, the engagement of Microsoft caused a conflict of

interest between the BDA and HP (Wingfield, 2005). In other words, Toshiba used the engagement as a strategy to undermine the BDA. As a result of this, HP would later force the BDA to follow Toshiba's policy.

However, Sony transformed this problem into an opportunity, and demonstrated that the BD standard was better than that of HD DVD. In the JavaOne trade show in 2005, the BDA announced that Sun Microsystems' Java software would be included in all BD players as a mandatory part of the standard, which they called BD-J. In contrast with the DVD standard, BD-J allows users to access networks, Picture-in-Picture, and expanded local storage, contents which the BDA described as "bonus content". In short, the BD-J technology was an alternative iHD technology. All BD players were required by their specification to support BD-J, and the BDA explicitly stated that the BD standard does not agree with HP's proposal to open its copyright protection policy.

After almost a month, the BDA spokesman told *Reuters* that they would not accept HP's request, but would continue to use BD-J in the BD standard and would not open the content protection mechanism (Belson, 2005). The BDA clearly understood that they had to balance the different expectations of various critical stakeholders, including Hollywood studios and manufacturers of PCs, and prioritized the needs of content providers.

The BDA did have confidence in their content protection mechanism. This was because some Hollywood studios had expressed concerns about Toshiba's rival managed copy mechanism, demonstrating that the mechanism of the HD DVD standard clearly contradicted their values and expectations. A few days later, Paramount announced that

they would end their exclusive support of the HD DVD standard (Edwards, Burrows & Grover, 2005). On 21 October 2005, the *New York Times* reported that Warner Brothers had announced that they had also ended their exclusive support of HD DVD and were now inclusively supporting BD (Belson, 2005). Having won the engagement of these studios, the BDA further strengthened market confidence in its copyright protection technology. Thus, the BDA adopted the BD+ in 2007, as an additional technology for the protection of BD disc content.

Toshiba's undermining strategy provided new opportunities for the BDA. Firstly, it made it possible for them to develop two new technologies in 2007, BD-J and BD+. This meant that, by extension, they gained the opportunity to strengthen confidence Hollywood studios in their copyright protection technology even further. The BDA used this strategy as retaliation, in order to undermine Toshiba. This shows that effective use of an undermining strategy can further strengthen the commitment of a collaboration and increase the power and legitimacy of the institutional entrepreneur. If it is not used well, the institutional entrepreneur may lose the support of its stakeholders.

Toshiba explicitly used other undermining strategies, in addition to the occasion involving Microsoft in 2007, to impede the BDA. In August 2007, *The Wall Street Journal* reported the announcement of Paramount and DreamWorks that they had chosen the HD DVD standard over the BD standard. Officially, Paramount said that this was because they wanted to devote all their resources to a single format. According to the announcements from these two studios, Toshiba clearly understood that network effects and product performance of the HD DVD standard were far behind those of the BD standard. But they did not want to surrender so easily. This was why few media

reports said that Toshiba had given huge financial incentives to these two studios (McBride, 2007), However, neither studios nor Toshiba wanted to comment on this:

The following day, after the announcement of this information on the media, Sony used a ‘undermining’ strategy to respond to this rebellion. Sony used comments from famous film directors in their response, and announced a new strategy to lower the price of the BD players.

At the same time as *The Wall Street Journal* reported this news, the BDA’s official site (<http://www.blu-ray.com>) presented the comments of Michael Bay and Steven Spielberg on the announcements of the two studios. The title of Michael Bay’s comments displayed on the BD site was: ‘Michael Bay Responds to Paramount’s Decision: "No Transformers 2 for Me!"’ The title expressed very clearly the fact that the director was not happy with the studio’s decision. On the other hand, although Steven Spielberg did not speak personally, the BD website quoted a statement from his spokesman, which, clearly stated Spielberg’s support for the BD standard²⁵.

As a consequence, analysing undermining strategies highlights the fact that, by using discursive activities, institutional entrepreneurs can further impede the power, legitimacy, and collective actions of their competitors.

²⁵ <http://www.blu-ray.com/news/?id=568>

7.2.10. Discursive Activities: Debating

The term ‘debating’ is defined as the way in which institutional entrepreneurs deliberately defend and explain their actions and behaviours when they are attacked by their rivals in the media. According to the *Collins English Dictionary* (1995), to ‘debate’ is to present supporting or opposing reasons or try to prove a point by presenting reasons, a meaning which is quite close to that of ‘argue’.

This strategy normally follows the discursive strategies of competitors. As discussed in previous sections of this study, the discursive strategies of institutional entrepreneurs implicitly or explicitly de-legitimise or erode the institutions, products, collaborations and other activities of those competitors. In order to defend themselves, convince the target market that their new solutions are better than those of their competitors or decrease the suspicions of the market, it is necessary for them to use a debating strategy.

However, my finding was that institutional entrepreneurs occasionally use the strategy to aggressively attack competitors. In such a case, both sides argue for their standards and actions in a variety of ways. They often provide statistics or comments from stakeholders to argue that their standards and products are better than those of their competitors. However, negative information is often disseminated not by competitors but by the media. In practice, the media provides not only balanced reports, but also reviews, editorials, opinion pieces and so on. Sometimes, reports of product tests and comments about them undermine the products and actions of institutional entrepreneurs. For these reasons, institutional entrepreneurs need to know how to argue their case, to refute these claims, and then defend their new institutions in other ways. If they do not

do so, they may lose their power and legitimacy. Consequently, although the example was happened in 2007, not in the specific time period (2002-2006), the study still proposes the practice in this phase.

Many debates were based on, or derived from, the various implications of the blue-violet laser, such as capacity and production costs. Both camps adopted the blue-violet laser technology so that they could record a greater amount of content onto a single disc. The DVD standard uses a red laser which transmits light at a wavelength of 650 nm, compared to the shorter 405 nm of the blue laser. This is important, because the shorter the wavelength, the smaller the focal point of the laser beam. In order to ensure compatibility, the HD DVD standard uses blue-laser to hold up to 20 GB of data while the BD standard is able to store 27 GB. This issue was heavily debated throughout the standard war. This was for the reason that a thinner substrate in the disc means that the laser can get even closer to the data.

As was demonstrated in the standard war between VHS and Betamax, Hollywood studios permanently require the highest possible amount of storage capacity for their content. At the beginning of their standard war, Toshiba used its other advantages to argue that the HD DVD standard would provide lower production costs and greater backward compatibility than the BD standard. At this time, they also had the support of many Hollywood studios. The BD camp therefore also used a debating strategy to respond to this criticism. The BD camp invited a critical stakeholder to argue in favor their policy (McBride, 2004).

In this standard war, many debating strategies were initiated by critical stakeholders, and/or in major technological exhibitions. By using critical stakeholders, debating strategies not only convey their actions and explain them, but also imply that these actions are endorsed and adopted by critical stakeholders.

If these debating strategies are used in the most important technological exhibitions, relevant information can win more media attention, because all parties are present at a single place and a single time. CEATEC (the Combined Exhibition of Advanced Technologies) in Japan, CES (the Consumer Electronics Show) in the United States, and many other professional conferences and exhibitions were used as locations at which to announce important information and/or argue for the advantages of each camp's standard throughout this standard war.

This study also finds that if institutional entrepreneurs do not use debating strategies effectively or respond to the media reports intended to undermine them, negative consequences could result. For instance, in January 2007, there was bad news for the HD DVD standard. *The New York Times* reported that it had been penetrated by a hacker calling himself Muslix64 (Markoff, 2007):

Some technical experts said that the method used by Muslix64 was a partial, but incomplete, solution to the challenge of copying digitally protected material. However, it was still troubling for the HD DVD camp (Markoff, 2007). The news suggested that using only A.A.C.S. to protect the content held by the HD DVD standard was not sufficiently secure. *The New York Times* pointed out that the content protection mechanism of the BD standard was superior to that of the HD DVD. Although the BD

and HD DVD standards had both adopted the A.A.C.S. encryption mechanism, the BDA also used an additional software-based component that made it possible to modify the copy protection system on new discs if the old system had been penetrated by hackers (Markoff, 2007):

This appears the question of why the HD DVD standard did not use the same content protection technology as BD. *The New York Times* demonstrated that this problem was caused by Microsoft:

Interestingly, the hacker's video demonstrating this breach of security is still available on YouTube, where it had originally been posted by someone calling him/herself 'hack247'. It has now been viewed more than 174,000 times. In the video, the hacker claims that a file labelled 'tkdb.cfg' was the critical key to decrypting A.A.C.S. protected movies²⁶.

²⁶ More information is available at: <http://www.youtube.com/watch?v=vOIKg9sIc2k>

Figure 7.6 A Snapshot of the Hacker's Video, as Posted on YouTube



Source: YouTube

According to the hacker, now that this file has been hacked, anyone can decrypt the content of HD DVDs. When I Googled the file name, I found that many hackers claim to supply 'BackupHDDVD', a software tool which is said to be able to decrypt a user-owned A.A.C.S.-protected DVD. These software suppliers also claim that users can then play it back using HD DVD software. After Muslix64 had supplied hacked material, many other hackers then also provided relevant information which was immediately diffused to other internet users. As a result, the weak encryption system of the HD DVD standard undermined both its own legitimacy and the support of Hollywood studios. It may also, cause other stakeholders to adopt the BD standard instead, which would give the BDA an advantage in offering a wider range of content.

I am unable to locate in the dataset any official announcements from Toshiba and the HD DVD camp, responding to the actions of the hacker and discussing their copyright protection mechanism. This may show that the HD DVD camp did not use debating or other discursive strategies to defend or explain themselves, argue, or express opinions concerning this instance of hacking. Not discussing the copyright protection mechanism, however, is likely to erode confidence of critical stakeholder in the standard, and reduce the possibility of their supporting it. There is no information in the dataset drawn from the BD site concerning hacking of BD players or PS3, at least until the end of the standard war. We can conclude that this comparison implies that the BD standard had better copyright protection technologies than the HD DVD standard.

This discussion illustrates a main issue in the standard war. It shows that without an effective debating strategy, negative information may erode the legitimacy of the standard and its network effects. In this case, this was because solving the issue of copyright was the main expectation of the Hollywood studios. The news of hacking demonstrated that the copyright protection of the HD DVD standard was weak.

7.2.11. Discursive Activities: Spokespersons

This study defines a spokesperson as a person who is responsible for representing a company to the media. The study has already shown, in its section on collective action, that the BDA has a Promotion Committee, the BDA's overall aim was to produce an united policy for the standard, and in order to provide itself with an unambiguous voice, it appointed a spokesperson. This was a finding only of the BD camp, and not of the HD DVD camp. This study will argue that having a spokesperson was very helpful in this

standard war, and that, in general, collective action influences discursive activity in standard wars.

Initially, I did not examine the role of spokespersons in the BDA. However, when my Japanese interviewee informed me that three BDA committees included people with this role, I was prompted to search for further information within the dataset. This was because the BDA's official website does not give the names of every member of each committee. I therefore only used 'spokesperson' as the keyword for my search in the dataset. The main advantage of the BDA is that it can present a 'unique voice' to communicate information about the BD standard and construct meanings for it.

According to the media report (*The New York Times*) in the dataset, the DVD Forum itself did not have a spokesperson during this standard war, unlike Toshiba, although their spokesperson, Keisuke Oomori, appeared only once in the *New York Times*, on 15 September 2004. The report says:

In this report, Oomori argued that Sony's acquisition of MGM would not have any impact on the HD DVD camp. In contrast, the BDA's first spokesperson was Marty Gordon, the vice president of Philips. In the *San Jose Mercury News* on 10 August 2005, he confirmed that the BDA was committed to offering the strongest possible content management system.

Marty Gordon, Josh Peterson and Andy Parsons all appear in media reports (e.g., Belson, 2005) in the dataset, as spokespersons for the BDA. In 2005, Peterson was Director of Strategic Alliances for H-P's optical-storage solution business. When

Microsoft backed the HD DVD standard in 2005, Peterson had acted as a spokesperson for it. However, when H-P then forced the BDA to adopt the open content protection mechanism, Peterson was not put forward as a spokesman for the BDA in media reports. Andy Parsons appears in the media report (Kerschbaumer, 2004) collected for this study in October 2004. At that time, he was Senior Vice President of Advanced Product Development for Pioneer Electronics (USA). In 2005, when he appeared in further media reports, he held not only this position but also that of spokesperson for the BDA. Later, Parsons was responsible for many announcements of official information and gave many media interviews. In contrast, there do not seem to be any references in the dataset to an official spokesperson for the HD DVD camp, while Keisuke Oomori, the spokesperson for Toshiba, himself only appeared once in these media reports, and his name could not be found in any later reports.

The head of the Promotion Committee, Andy Parsons of Panasonic, is also the BDA's most senior spokesperson. At the time of my interview in Japan, Andy Parsons was President of the BDA. As my earlier discussion of membership structure suggested, the presence of a senior manager of Panasonic on the Promotion Committee ensured that the company's decisions and promotional policies would not contradict those of the BDA. This was because Panasonic was one of the facilitators of the BDA.

7.2.12. Collaboration Structuring Capabilities: Organizing Promotion

After the practices of promoting and spokespersons on discursive activities, the BDA presents the importance of organizing promotion on collaboration structuring capabilities in the standard war. This strategy is defined as the use by institutional

entrepreneurs of collaborations to define campaigns and utilize strategies, in order to promote and target standard and relevant technologies to relevant audiences. Like discursive activity in a standard war, promotion means that institutional entrepreneurs define and approve promoting and marketing campaigns in collaborations, and then the members of those collaborations create their own relevant campaigns. Without an united plan, institutional entrepreneurs are unable to produce the required ‘unambiguous voice’ for their audiences. This may create suspicion and lead to misunderstandings within the market. Moreover, it may also negatively influence the network effects and product performance of a standard, or even the resources of institutional entrepreneurs themselves.

One of the main problems of the DVD standard, for instance, is that there were too many formats, something which purchasers found confusing. The DVD standard had been introduced to the market in 1995, and the its large number of sub-formats meant that consumers had become very confused. Different types of discs were often not be compatible with other players. In this situation, institutional entrepreneurs needed to use their collaborations to produce an integrated standard. Moreover, throughout standard wars, institutional entrepreneurs may have to confront many different attacks from rivals and queries from stakeholders. In order to create an unambiguous voice and an integrated policy, institutional entrepreneurs need promotion teams which are responsible for dealing with these arguments and promoting such integrated standards.

According to the BDA’s by-law v.1.9, its promotion committee strategically promotes the BD standard in various ways, including advertising campaigns, showcases and

education and training programs for audiences. So far, this committee has established promotional teams in America, Europe, Japan and the Asia/Pacific region, and China.

Before the BDA or other member companies announce any information to the media, it must be endorsed by a BOD meeting. The communication of information and construction of meaning are very critical to the BDA. This is because these decisions are made by the BOD. Moreover, the chair of the Promotion Committee is its spokesperson in the BDA. With the chair of the Promotion Committee as its spokesperson, the BDA can maximise a guarantee that no media message will contradict the policies of the BDA or mislead the audience.

In this way, the BDA possesses a promotional team and a spokesperson who are responsible for the promotion of relevant information and technologies to markets. Indeed, the possession of a committee responsible for the promotion of a single voice for the BDA is a major difference between them and the DVD Forum. This is because the BDA understands that an integrated media message is critical in a standard war, as correcting the misunderstandings of the audience or of stakeholders may be a costly task. Moreover, misunderstandings will also leave space for rivals.

In short, during 2002 to 2006, both camps established the collaborations to deal with many different tasks. Although many practices were happened at the same moment, in general, the institutional entrepreneurs should establish a certain extent of power, legitimacy, and the specifications of the new standard first. By using these resources and prototypes of the new standards, they can provide compelling reasons to increase the likelihood of the adoption by publics and other prospective organizations.

To summarize, in the collaboration structuring capabilities aspect, this study claims that five categories should be included in the capability. These are ‘the institutional entrepreneur’s portfolio’, ‘the structure of membership’, ‘product development activities’, ‘frequent communication’ and ‘organizing promotion’.

Collective action in standard wars not only leads to interactions between the resources of institutional entrepreneurs but also produces network effects and product performance. With effective capabilities, collective action can lead to the consolidation of an institutional entrepreneur’s resources. In its analysis, this study will demonstrate that these capabilities can assist institutional entrepreneurs to maintain and develop relationships with critical stakeholders, which then lead to increases in their power and legitimacy. Moreover, when institutional entrepreneurs satisfy the requirements of critical stakeholders and respond to their expectations, they will engage further in collaboration and invest their resources in projects of change, such as product development activities and promotion. Furthermore, in order to retain and increase competitive advantage, institutional entrepreneurs need to manage collaborations effectively. In its standard war, the BDA established a hierarchical membership structure which assigned different responsibilities and obligations to different members. Within their collaboration, the BDA also produced additional strong network effects and product performance, as in the cases of BD+ and PS3.

This section has also shown that effective collective action can lead to discursive activities, a relationship which was not presented as part of the conceptual framework in Chapter 5. For instance, the BDA’s Promotion Committee is responsible for the

generation of promotional policies and market campaigns. If it has these integrated plans, the BDA can generate an unambiguous voice and avoid excessive costs when dealing with questions and suspicions of the audiences.

Table 7.4 Comparison between Sony and Toshiba's Actions in Collaboration

Structuring Capabilities

Collaboration Structuring Capability	Sony	Toshiba
The institutional entrepreneur's portfolio	1. Its portfolio was the companies establishing the BDF then deliberately invited several companies to diversify the portfolio.	1. Its portfolio was Steering Committee of DVD Forum.
The structure of membership	1. BDA's structure of membership has multiple functions, including create, uphold, and promote.	1. DVD Forum mainly focuses on the function of technical and verification.
R&D activities	1. BD standard successfully integrated with PS3. 2. BD standard successfully developed the additional copyright protection technology: BD+	1. It did not integrate the standard with Microsoft's Xbox 360. 2. It did not develop further protecting technology on copyright for their critical stakeholders.
Frequent communication	1. BDA has four general meeting in a year and many times of meeting in each committee.	1. The dataset does not have evidence to showing frequent communication in DVD Forum.

Collaboration Structuring Capability	Sony	Toshiba
Organizing promotion	<ol style="list-style-type: none"> 1. The promoting discourse and strategies are endorsed by BDA meeting. 2. Having the teams in the committee which is responsible of promoting the standard around the world. 3. Establishing spokesperson in the BDA. 	<ol style="list-style-type: none"> 1. According to the available data, DVD Forum did not generate unambiguous voice as BDA. 2. Due to data limitation, specialized promoting team in DVD Forum can not be identified. 3. In the dataset, only one spokesperson can be identified.

Source: Author

In this way, this study suggests that institutional entrepreneurs need to use product development activities and relational closeness to determine who their critical stakeholders are in standard wars. Product development activities can be viewed as task-related criteria, which focus on the operational requirements of technological objectives. Relational closeness is a partner-related criterion, which has more to do with the qualities of the partners, and impacts on both the efficiency and effectiveness of the coordination. In other words, institutional entrepreneurs should use concentric circles to depict their stakeholders. Companies in the inmost circles have the most intensive product development activities and close relations with institutional entrepreneurs. The new typology can be seen as one of the theoretical implications of this study.

Table 7.5 Additional Findings Concerning Collective Action

Findings from Collective Action	Findings
Collective action leads to discursive activities	The BDA case shows, having integrated plans can generate an unambiguous voice and avoid excessive costs when dealing with questions and suspicions of the audiences.
Traditional definition of stakeholders may need to be refined in standard war.	This study suggests that institutional entrepreneurs need to use R&D activities and relational closeness to determine who their critical stakeholders are in standard wars.
Collective action leads to interactions between the resources of institutional entrepreneurs.	<ol style="list-style-type: none"> 1. Critical stakeholders management and collaboration structuring capabilities can assist institutional entrepreneurs to maintain and develop relationships with critical stakeholders, which then lead to increase in their power and legitimacy. 2. When institutional entrepreneurs satisfy the requirement of critical stakeholders and respond to their expectations, they will engage further in collaboration and invest their resources in changing project. 3. Institutional entrepreneurs may confront pressures from different stakeholders. They should deliberately respond their pressures. Otherwise, their responses may conflict with their stakeholders then cause negative outcomes.

Source: Author

This study also figures out some specific attributes of discursive activities in the standard war, including ‘framing’, ‘promoting’, ‘debating’, ‘undermining’, and ‘spokesperson’. Sony and Toshiba generally did not use a single strategy at any one time, but more often used a group of strategies, such as ‘framing’, ‘debating’ and ‘undermining’, in combination. In order to clearly present these findings, the study will discuss each attribute separately. The main data sources for this research are all media reports in the dataset and the news archive of BDA’s official website.

Table 7.6 Comparison between Sony and Toshiba's Actions in Discursive Activities

Discursive activities	Sony	Toshiba
Framing	<ol style="list-style-type: none"> 1. Providing compelling reason to frame the change is necessary. 2. Sony used three famous engineers to create the new specifications of BD standard quickly. 	<ol style="list-style-type: none"> 1. Providing compelling reason to frame the change is necessary.
Promoting	<ol style="list-style-type: none"> 1. To promote that the standard was legitimized by critical stakeholders and motivate other companies to engage in the camp. 2. To further strengthen their existing framing strategy. 3. To promote end products. 	<ol style="list-style-type: none"> 1. To promote that the standard was legitimized by critical stakeholders. 2. To further strengthen their existing framing strategy. 3. To promote end products.
Debating	<ol style="list-style-type: none"> 1. Actively using statistics or comments from stakeholders to debate its own standard. 2. Revealing the debating discourses in technological exhibitions for catching media attention. 	<ol style="list-style-type: none"> 1. Certainly, it actively used debating strategy, including stakeholders and exhibitions. However, it did not well debate some critical events. Hence, it caused negative consequences to HD DVD.
Undermining	<ol style="list-style-type: none"> 1. Transforming Toshiba's action into an opportunity, Sony developed the BD+ and forced critical stakeholders to choose a specific standard to support. 	<ol style="list-style-type: none"> 1. To undermine the BD camp by using Microsoft's engagement and relevant specifications.
Spokesperson	<ol style="list-style-type: none"> 1. Actively used spokespersons to provide unambiguous voice to audiences. 	<ol style="list-style-type: none"> 1. Did not actively use spokesperson in the standard war.

Source: Author

The section of discursive activities has presented many arguments about standard wars. Firstly, by using discursive activities, institutional entrepreneurs can increase and strengthen their power and legitimacy. This was shown by the BDA's engagements of Hollywood studios, when its use of discursive activities to promote those engagements constructed the meaning that the BDA had greater support from critical stakeholders than HD DVD. This information conveyed the additional message that Sony had more connections and areas of cooperation with important companies. Thus, Sony's power in this standard war grew further. Equally, the BDA's addition of the BD+ to the BD standard constructed another message to the audience that the BDA had researched and developed more patents and technologies to make the its standard even stronger.

Secondly, the use of discursive activities can increase network effects and product performance of standards. For example, the use of promoting strategies helped institutional entrepreneurs to increase the sales figures for disc players and PS3. Additionally, the more Hollywood studios, game software developers and publishers were acting in collaboration with the BDA, the more their game software and movie titles increased the network effects of standards.

Several additional findings derive from this section. Firstly, the study showed that interaction effects exist between discursive activity and collective action. Although Chapter 5 suggested that collective action and discursive activities should be discussed separately, these findings show that the effects of interaction should not be ignored. In this standard war, institutional entrepreneurs promoted the performance of collective

actions to stakeholders and markets through the use of discursive activities. For instance, the BDA announced that critical stakeholders including Disney and Lionsgate were collaborating with them. The announcement not only communicated this to other companies and markets, but also constructed the meaning that the BDA was increasing its support from Hollywood studios. The study shows that collaborations also give rise to discursive activities. By using spokespersons, institutional entrepreneurs can present unified messages which answer the criticisms and suspicions of their audiences.

Secondly, this study aims to determine the role of core employees in standard wars. As a result, it enables me to introduce another category, the effect of human resource management on core employees and individual social capital. In the section on framing strategy, this study showed that three 'master' engineers assisted the BD standard to rapidly promote itself to other engineers who had worked with these masters. Sony, Panasonic and Philips saw these master engineers as core employees, and as one of their competitive advantages.

Institutional entrepreneurs cannot expect core employees to actively promote new technologies to engineers who work for other companies, unless they nurture these core employees. Since the skills of these core employees are of great importance to institutional entrepreneurs, and as they are valuable and rare, companies need to use specific human resource practices to increase the these core employees' commitment to them. Companies should also assist these core employees to establish their personal social capital. By doing this, institutional entrepreneurs can use this personal social capital to explore opportunities and motivate other companies to engage in the project of change. They can also use core employees to frame and promote new technologies. I

will further discuss the role of human resource management in terms of core employees and personal social capital in Chapter 8.

Finally, when I discuss issues of power and legitimacy, I will discuss the ways in which their influence affects the relationship between them. My Japanese interviewee told me that these three masters ensured that the BD standard was rapidly adopted by engineers in other companies, because these other engineers had personal relationships with the masters. The opinions of these engineers may have influenced the decisions of their companies in their standard war. If they have organizational social capital, the power and legitimacy held by institutional entrepreneurs can easily lead to collective action. If they have also effective structural social capital, institutional entrepreneurs can easily accumulate power and legitimacy using collective action and discursive activities. This will be discussed in more detail in Chapter 8. In general, the study aims to propose a new category, which not evident in the literature review for standard wars and institutional entrepreneurship.

Table 7.7 Additional Findings Concerning Discursive Activity and Institutional Entrepreneur’s Core Employees

Findings from Discursive activities	Findings
Discursive activities lead to strengthening institutional entrepreneur’s power and legitimacy.	<ol style="list-style-type: none"> 1. Especially, using critical stakeholder’s words, this information conveys the additional message that institutional entrepreneurs had more connections and areas of cooperation with importance companies. Its power can be grew further. 2. Equally, it shows another message to the audience that the institutional entrepreneurs had researched and developed more patents and technologies to make the standard stronger.

Findings from Discursive activities	Findings
Discursive activities lead to increasing network effects and product performance.	The institutional entrepreneurs can increase network effects and product performance of standard by promoting the standard and critical stakeholders' signals.
Interaction effects exist between discursive activities and collective action.	<ol style="list-style-type: none"> 1. In this standard war, institutional entrepreneurs promoted the performance of collective actions to the audiences by using discursive activities. 2. By using the activities, institutional entrepreneurs can present unified messages which answer the criticisms and suspicions of their audience. In turn, they can motivate other prospective companies to engage in the changing project.
The effect of human resource management on core employees lead to their social capital then lead to collective actions.	Institutional entrepreneurs should nurture their high value and unique employees (core employees) to actively promote new technologies. Institutional entrepreneurs should also assist these employees to establish their personal social capital. Then, they can use this social capital to explore opportunities and motivate other companies to engage in the project of change.

Source: Author

7.3. 2006-2008, Marketing War

In general, both camps launched the new disc players and other products associated with the new standards in markets and put much more efforts on seeking exclusive supports from their critical stakeholders. Many product development activities were completed at the moment. Rather than prospective organizations, both camps tried to convince consumers to adopt the new products and relevant complementary products in order to increase the network effects of the new standards.

According to the conceptual framework, this study expects that product performance will positively lead to network effects in standard wars. However, because of data

limitation, the detailed market numbers, such as the sale amount of the new disc players, game consoles, and etc., the study can not confirm the causal relationships between product performance and network effects.

7.3.1. Product Performance

In a standard war, product performance is defined as the way in which the technical quality and price of a product are developed by institutional entrepreneurs and must satisfy stakeholders and customers. According to this definition, product performance is decided by institutional entrepreneurs and their partners in a standard war, and is both stakeholder-oriented and customer-oriented. In other words, a good product should satisfy the requirements of both parties. I collected the information used in this section from media reports and from Datamonitor.

As discussed in the previous sections, Sony and Toshiba both had strategies for product performance. Firstly, both firms used blue-laser technology to develop the BD and HD DVD standards. In order to save production costs and to shorten the production line from DVD to the HD DVD standard, the substrate layer used by Toshiba was not as thin as that of the BD standard. Although this decision resulted in a straightforward upgrade to the production line, it also resulted in a sacrifice of capacity. In contrast, Sony used a thinner substrate layer to produce the BD standard. Although the BD production line could not be upgraded in the same way, the capacity of the BD standard was greater than that of the HD DVD. As a result, capacity and production costs were the two main issues in the framing, promoting, debating and undermining strategies of both camps which they used throughout the standard war as part of their discursive activities.

Secondly, Toshiba claimed that the HD DVD players had backward compatibility with DVDs. This strategy had a great deal of support from Hollywood studios at the beginning of the standard war. In contrast, Sony did not promote the compatibility of disc players but of games consoles. In other words, the PS3 was not only compatible with BD players but also with PS2 game softwares. The aim was to utilize the installed base of the PS2²⁷ and then rapidly to increase the economic scale of BD players by using network effects.

Thirdly, copyright protection was the most important issue in this standard war. Sony used this issue to successfully win the attention of Hollywood studios, and attract their support for the BD standard. In contrast, Toshiba's strategy was to attract the support of end users. This was because, for customers, allowing disc content to be copied onto PCs was a easier and cheaper way for customers to share this content.

Fourthly, Sony and Toshiba had different pricing strategies in this standard war. Toshiba used a lower price strategy in an attempt to rapidly increase the economic scale of the HD DVD players, a strategy which was successful. HD DVD, however, used a higher priced games console, the Microsoft Xbox 360. Toshiba and Microsoft did not combine the HD DVD and Xbox 360, but used HD DVD players as an add-on. Customers had to buy additional HD DVD players and plug the Xbox 360 into them. In contrast, although Sony decided to use a higher price to promote the BD players, the PS3 was perfectly integrated with them. As a result, the market share of BD disc players, including that of the PS3, was greater than that of the HD DVD disc players. Table 7.5 gives this

²⁷ Due to the huge installed base on PS2, all PS3 module support for PS2 backward compatibility.

information in detail, in order to clearly demonstrate the differences between PS3 and Xbox 360.

In this standard war, Microsoft priced the HD DVD drive at just \$199 (see Table 7.5). This pricing strategy was mistaken. The 20GB version of the PS3 was priced at \$499, whereas the equivalent version of Microsoft's Xbox was priced at \$399. In other words, if consumers wanted to purchase a Xbox 360 with an HD DVD drive, they would have had to pay almost \$600. Moreover, the Xbox 360's WiFi adapter is optional, but the equivalent adapter is integrated into the PS3. As the report does not give the price of the adapter for the Xbox 360, the final price could be even higher than \$599. The combined result of these strategies was to make consumers choose the PS3, because of its better price and value.

Table 7.8 Comparison between Sony PS3 and Microsoft Xbox 360

Hardware	Connectivity	DVD	Games	Cost
Sony PS3	20GB Version Bluetooth 2.0, an Ethernet port and four USB docks	Integrated BD player Backwards compatible with DVD	In 2007, 50 games are expected to be available by the end of the year	20 GB version \$499 60 GB version \$599
Microsoft Xbox 360	Option to purchase WiFi adapter Core version: Three USB docks, Ethernet port 20GB version: Wireless controllers	DVD player Additional HD DVD drive available for \$199	c130 titles with c.65 of those available for Xbox Live Multi play Backwards compatible	Core version \$299 20 GB version \$399

Sources: Business Insight, Datamonitor

However, this evidence does not show why Microsoft used this pricing strategy, and why Toshiba and Microsoft decided that their games console should not be directly integrated with the HD DVD player. This decision clearly gave Sony and the BD camp another chance to increase the size of the market for the BD standard. As a result, the PS3 can be seen as a Trojan horse in this standard war. Additionally, its predecessor, the PS2, had a considerable installed base. Toshiba and Microsoft's strategies could neither contain the growth of the PS3 nor increase the sales of the HD DVD standard. Although both camps used games consoles in order to promote their standards, therefore, different promoting strategy led to different outcomes in this standard war.

As a result of this, *The Wall Street Journal* reported in August 2007 that Toshiba had taken the lead in hardware sales, because of the lower price of HD DVD players (McBride, 2007). However, the BD standard had taken a big lead in sales of film titles, because of the PS3 and because it had gained widespread support from Hollywood studios.

Except for the price performance, Sony and Toshiba struggled for the other performance, including capacity, copyright protection, backward compatibility, and video and audio. The capacity and copyright protection performance have been discussed in the foregoing sections. In general, the BD standard has better performance on copyright protection and capacity. The HD DVD standard has better backward

compatibility performance. Both BD and HD DVD have similar performance on video and audio.

All HD DVD players are backward compatible with DVD and CD. Essentially, because of the structure of the single-lens optical head, both red (the basic technology of DVD standard) and blue laser (the basic technology of BD and HD DVD standards) diodes can be used in smaller, more compact HD DVD players. However, this optical head constrains the capacity of the HD DVD standard. Because, the red laser needs thick substrate layer to store data. In order to account for backward compatibility, the HD DVD standard used more thick layer than the BD standard. Thus, the standard can also read DVD discs. In other words, primary specification of HD DVD standard constrains its capacity. However, the HD DVD standard can provide full backward compatibility.

On the aspect of audio and video quality, both standards allow various technologies to provide better result. Both BD and HD DVD standard have similar audio quality. Sony's first BD disc player did not provide HDMI technology but Full HD 1080p. However, basically, customer's AV receiver (like TV) should support 1920x1080 pixels. Otherwise, customers can not enjoy the best quality of video.

In general, this study has demonstrated that the product performance in this standard war was mainly driven by collective action and discursive activities. This was because the specifications of the products (their capacity, compatibility, production costs, video and audio quality and copyright protection systems) were developed and theorized collaboratively, while the pricing strategies for disc players and game consoles were also decided by the BDA and the DVD Forum. Moreover, institutional entrepreneurs

used various discursive activities to frame, promote, undermine and debate their own advantages and disadvantages of their rivals. In this standard war, Sony successfully convinced many Hollywood studios that the capacity and copyright protection of the BD standard were better than those of the HD DVD standard. The price of the PS3 was also cheaper than that of the Microsoft Xbox 360, when it was part of a combined product. Besides, the study suggests that both standards provide very similar video and audio quality. Although the HD DVD standard is compatible with DVD discs, it sacrifices its storage capacity. In this way, the effective product performance (capacity, copyright protection and price) of the BD standard led to greater network effects. The evidence for this will be discussed in the next section, on network effects.

Table 7.9 Comparison between Sony and Toshiba's Actions in Product Performance

Product performance	Sony	Toshiba
Using blue-laser technology	Yes	Yes
Backward compatibility	No (BD players) Yes (PS3)	Yes (both HD DVD players and Xbox 360)
Copyright protection	Yes (AACs and BD+)	Yes (AACs)
Price	High price on BD players Low price on game console	Low price on HD DVD players High price on game console
Capacity	High	Low
Production costs	High	Low

Source: Author

7.3.2. Network Effects

‘Network effects’ are defined as the effects that one user of a product or service has on the value of that product or service for other people. In this standard war, the network effects of disc players came from complementary products, such as film titles and game consoles. This variable shows once again why Hollywood studios and games consoles played such critical roles in the standard war. I collected the data for this section from Euromonitor. However, the database only provides the data from 2005 and the duration of standard war is from 2002 to 2008. That is why I only compare the data from 2005 to 2008.

At the very start of this standard war, Hollywood studios were seen as critical stakeholders. This was because widespread support from Hollywood studios had been a critical factor in the victory of JVC VHS in that earlier standard war. Moreover, in order to strengthen their product performance, Sony and Toshiba deliberately invited leading consumer electronic manufacturers, who were their critical stakeholders, to join them in their collaborations. In order to successfully generate these network effects, both camps used collective action and discursive activities to motivate critical stakeholders to join their collaborations, manage them as symbiotic members, use their comments to endorse the standards, and argue against market suspicions in order to strengthen their commitment to the standards. This is the reason why Toshiba gave financial incentives to Paramount and DreamWorks to persuade them to back the HD DVD standard instead of the BD standard.

On the other hand, both camps also used game consoles to promote the standard, as games consoles produce their own network effects through their use of gaming software. Furthermore, the installed base of games consoles provided a good platform, paving the way for the disc players. As I mentioned in my section on the history of Sony, when the PS2 was released, it contained a DVD player as well as upgraded music and video features. By 2006, Sony had sold 100 million games consoles and 1 billion units of gaming software. As long as gamers wanted to upgrade to the PS3, millions of PS3s would seed the market for BD players, providing huge economies of scale and performance for Hollywood studios, which are typically reluctant to back two rival standards. Furthermore, since the advent of the PS2, Sony's game consoles have had internet capability. Sony needed the PS3 if it was to maintain its dominance of the game console industry, as well as in the emerging market for internet video downloads (*The Economist*, 2006). From the moment Sony unveiled the PS3, on 17 November 2006, all its models have had built-in BD players. The 20GB model did not have a Wi-Fi connection, although the 60GB model did. The aim of this was to enable all users to experience the high-definition quality of BD. This was important because pre-teens (aged 7-12) and teenagers (aged 13-19) are the most important consumers of games consoles. Sony can enable these users to experience the BD standard with the 20GB model. However, with the 60GB, Sony could reach adult purchasers with deeper pockets, who could buy videos, films and other complementary products online.

Thus, three months after the launch of the BDP-S1, Sony launched the PS3, the weapon which would generate the real network effects of the BD. Two months after the launch of the PS3, on 9 January 2007, the BDA announced their figures and the result of their

customer survey on their official website²⁸. According to this information, the PS3 had successfully seeded BD players into customers' homes and had become the main movie players in their homes (Ramstad & McBride, 2007).

Furthermore, information on the Euromonitor database suggests that the PS3 may be successfully exploiting users of adult video games. The 60GB model allows Sony to successfully target those customers with enough money to enable them to buy the PS3 and also download complementary products from Hollywood studios and other content providers.

Table 7.10. U.S. Video Gaming Population in 2005 to 2008 (%)				
Age Group	2005	2006	2007	2008
Total population playing video games	50.7	50.2	57.1	59.5
Pre-teens (aged 7-12) playing video games	84.6	85.6	87.6	87.6
Teenagers (aged 13-19) playing video games	84.1	85.1	86.6	87.6
Adults (aged over 20) playing video games	45.0	44.0	53.0	56.0

Source: Euromonitor

Table 7.10. shows that teenagers and pre-teens are the main consumers of video games consoles. Furthermore, the table also answers the question of why the number of adult users increased markedly in 2007. They may have had more money than people aged under 20, and so Sony's 60GB version became the home entertainment centre for this group.

²⁸ More information is available at: <http://www.blu-ray.com/news/?id=117>

However, we cannot ignore another factor, the Nintendo Wii, as this product introduces a new way of playing video games, and has been seen as allowing the industry to exploit an entirely new market. However, as the database does not provide figures for the market of each game consoles, I cannot give exact sales numbers and user profiles for either the Xbox 360 or the PS3.

As well as investigating the population of video gamers, this study explored the database further and compared the market numbers and statistics of PCs and video players. After both camps launched their disc players into the US market in 2006, the size of the market for video players per household grew from \$17.9 to \$19.5 in 2006 but fell to \$15.4 in 2007, and \$15.6 in 2008. Similarly, in the computer market, market size per household grew from \$176.9 to \$175.1 in 2006 and grew again to \$182.3 in 2007 ,but fell back to \$178.8 in 2008. However, the market size per household in the video games market grew from \$95.4 to \$111.3 in 2006, and to \$155.1 in 2007, reaching \$177.2 in 2008. This was mainly because Nintendo, Microsoft, and Sony launched their new game consoles in the US market in 2007, and so the numbers sold per household greatly increased (see Table 7.11.).

Table 7.11. U.S. Market Size of PC, Video Players, and Video Games in 2005 to 2008 (US\$ per household)				
Products	2005	2006	2007	2008
Computers	176.9	175.1	182.3	178.8
Video Players	17.9	19.5	15.4	15.6
Video Games	95.4	111.3	115.1	177.2
Video Games Hardware	37.3	50.1	75.5	84.4

Table 7.11. U.S. Market Size of PC, Video Players, and Video Games in 2005 to 2008 (US\$ per household)				
Video Games Software	58.1	61.2	79.5	92.9

Source: Euromonitor

According to this per household table, although PCs also received a boost in 2007, the rate of growth was not bigger than that for video games hardware. The reason for this is that Microsoft's new operating system, Vista, did not greatly increase the market. This software system did not encourage many customers to buy new PCs. Using Microsoft's operating systems to seed the HD DVD players was not, therefore, a successful action in this standard war (see Table 7.12.).

Table 7.12. The Yearly Growth Rate in PC, Video players, Video Games in the U.S. Market (%)			
Products	2005-6	2006-7	2007-8
Computers	-0.1	5.6	-0.8
Video Players	10.1	-19.7	1.9
Video Games	17.7	41.3	15.5
Video Games Hardware	35.6	52.9	12.9
Video Games Software	6.3	31.7	18.0

Source: Euromonitor

According to this table, the yearly growth rate for video games is more than that for computers and video players. In particular the yearly growth rate of video players in 2006-07 was -19%. The reasons for is that Wii, Xbox 360, and PS3 were all launched in

2006. They not only increased the overall sales figures for video, but also eroded the market of some existing video players. In order to prove the theory, I will further explore the U.S. customer's expenditure in the relevant category in Table 7.13.

Table 7.13. Expenditure by U.S. Consumers on Audio-Visual, Photographic, Information Processing, Other Recreational Items and Equipment, Gardens and Pets, 2005 – 2008 (\$)				
Categories	2005	2006	2007	2008
Audio-visual, Photographic and Information Processing Equipment	2,277.2	2,398.0	2,486.8	2,491.5
Other Recreational Items and Equipment, Gardens and Pets	1,696.6	1,795.8	1,874.4	1,897.1

Source: Euromonitor

According to the definition in the database, spending on equipment for the reception, recording and reproduction of sound and pictures is part of the category designated as 'consumer expenditure on audio-visual, photographic and information processing equipment.' 'Consumer expenditure on other recreational items and equipment, gardens and pets' includes spending on video players and video gaming hardware and software. This table of expenditure shows that customers in the US have fixed expenditure in these two categories. It also shows that Microsoft's new operating system, Vista, did not boost the market very much. This software system did not make many customers buy new PCs. This shows that using Microsoft's operating systems to seed the HD DVD players was not a successful action in this standard war.

As a result, this study can confirm that institutional entrepreneurs use their power and legitimacy by performing collective actions and discursive activities to motivate and manage stakeholders, and to theorize and develop the specifications of their products in collaborations. At the same time, they also use discursive activities to promote their products, and to defend themselves against the accusations of rivals and stakeholders. In this way, product performance satisfies their stakeholders. All of these actions result in increased network effects.

Table 7.14. Comparison between Sony and Toshiba’s actions in Network Effect

Network effects	Sony	Toshiba
Using Hollywood studios’ pre-recorded content to generate network effects	Yes	Yes
Using game consoles to promote the standard	PS3	Xbox 360
Using PC operating system to promote the standard	No	Yes, but Vista did not boost the market very much.

Source: Author

7.3.3. Critical Stakeholders Management Capabilities: Seeking Exclusive Support

The institutional entrepreneurs’ collective action and discursive activities are continuous in the standard war. Although the study discusses the most of the relevant activities in the second phase, the study distills some specific practices (seeking exclusive support and giving incentives), which can be categorized into critical stakeholders management capabilities. Because, the institutional entrepreneurs only used these practices to the

critical stakeholders, who are capable of providing considerable functional and symbolic resources to the institutional entrepreneurs.

The term 'seeking exclusive support' can be seen as a process of seeking the exclusive support of critical stakeholders in standard wars. Having exclusive support means that content providers will only produce complementary products to a specific standard then the standard can steadily increase the network effects of economic scale by using complementary products. Before the joint announcement by Microsoft and Toshiba, Hollywood studios' support to the HD DVD standard was inclusive, even though different Hollywood studios had separately joined both parties. After the Microsoft event, Paramount announced that they would end their exclusive support of the HD DVD standard (Edwards, et al., 2005). On 21 October 2005, the *New York Times* also reported that Warner Brothers had announced that they had ended their exclusive support of the HD DVD camp and were now inclusively supporting the BD camp (Belson, 2005).

Before the studios made their announcement, Paramount, Warner Brothers and Universal had all exclusively supported the HD DVD standard, and controlled 45% of the market for that generation of discs (Belson, 2005). On the other hand, those studios that were in the BD camp (Lionsgate, Sony Pictures, Disney, and 20th Century Fox) held about 45% of the US DVD market. Indeed, if MGM's film library was included in the figures for the BD camp²⁹, it held almost 50% of the DVD market. In this way, the announcement from Paramount and Warner Brothers put pressure on the HD DVD

²⁹ In 1989, Sony acquired the American film and television production company Columbia Pictures for US\$3.4 billion. The company was renamed Sony Pictures Entertainment in 1991. In 2004, MGM was purchased by a group led by Sony. According to media reports, by buying MGM's studio and its film library, Sony was trying to move the long battle over the new DVD format in its direction (Belson & Sorkin, 2004).

camp. In other words, after the engagement of Windows in Toshiba camp, the HD DVD camp began to lose their advantage over the main providers of content in this standard war.

7.3.4. Critical Stakeholders Management Capabilities: Giving Incentives

The term ‘giving incentives’ is defined as a process in which tangible or intangible resources are used to attract the engagement of critical stakeholders. In August 2007, *The Wall Street Journal* reported that Paramount and DreamWorks had announced that they had chosen the HD DVD standard instead of the BD. Paramount said explicitly that this was because they wanted to put all their resources behind one format. In fact, Toshiba had offered huge financial incentives, such as marketing support and cash payments (McBride, 2007). The market share of the HD DVD standard’s disc players was better than that of the BD players, because of its cheaper pricing strategy (McBride, 2007). However, if sales figures for PS3³⁰ had been added to the market share for disc players, the BD standard was clearly far more successful than the HD DVD standard. Therefore, following the announcements from these two studios, Toshiba was left in no doubt that the network effects and product performance of the HD DVD standard were far behind those of the BD standard. It did not intend to surrender so easily, however, and used a strategy to win back the commitment of these two critical stakeholders.

According to the reports of the journalist, Sony also developed incentives to encourage critical stakeholders to join the BD camp. This journalist claimed that at the very

³⁰ ‘PS3’ is the official abbreviation of PlayStation 3. This is the third home video game console produced by Sony Computer Entertainment and the successor to the PS2 as part of the PS series. The PS3 competes with the Microsoft Xbox 360 and the Nintendo Wii, as part of the seventh generation of video game consoles. In order to successfully promote the BD standard, Sony included it in the PS3. In other words, consumers can use the PS3 to watch BD discs.

beginning of the collaboration, Sony gave a percentage of future royalties to founder companies as an incentive. In this way, even institutional entrepreneurs could offer as an inducement a share of future sales, rather than money upfront.

Although the example proposed in seeking exclusive support practice was happened in 2005, logically, the practice is the goal of critical stakeholder management capabilities. In the standard war, both institutional entrepreneurs understood the critical stakeholders' expectations and responded their requirements in order to their exclusive support. Although these two practices were continuous throughout the standard war, discussing them in the final phase, the study can further highlight the importance of critical stakeholder management capabilities in the standard war.

To summarize, this study has shown that the management of critical stakeholders is important in institutional entrepreneurship. Its findings have also described the process through which institutional entrepreneurs can successfully persuade critical stakeholders. Moreover, this study has also determined that the traditional definition of stakeholders (e.g. Mitchell et al., 1997) may not be appropriate in this context. In this way, the dataset and analysis show that a new typology of stakeholder is emerging in the form of the institutional entrepreneur.

Table 7.15. Comparison between Sony and Toshiba's Actions in Critical Stakeholder Management Capabilities

Critical stakeholder management capabilities	Sony	Toshiba
Understanding expectations	1. Focused on practicing copyright protection mechanism for BD.	1. Focused on practicing cheap manufacturing process for HD DVD.
Responding to requirements	1. Including AACS, Sony further developed BD+ to BD standard.	1. Only adopted AACS as the copyright protection mechanism. 2. Further announced that the standard would open copy system to users.
Seeking exclusive support	1. Increasing Hollywood studios' support to 45%, either inclusively or exclusively.	1. By using cheaper production costs, before Microsoft's engagement, Toshiba held certain Hollywood studios' support in US market (45%).
Giving incentives	1. According to the journalist's opinion, Sony gave a percentage of future royalties to founder companies as an incentive.	1. Toshiba gave huge financial incentives to Paramount and DreamWorks for their exclusive support.

Source: Author

7.4. Additional Findings of Data Analysis

Except human resource management on core employees and their personal social capital discussed in the foregoing sections, this study further figure out one new category: media influence. In the literature review, Freeman (1984) does not pay much attention to media, even though he recognizes that the media is a stakeholders in the business

environment. He claims that the media represents a form of external change for managers who wish to succeed in the current environment. Furthermore, studies of relevant standard wars and of institutional entrepreneurship, also do not pay attention to the role of media influence.

Apart from routine reports, the media also analyzes the strategies of companies and reviews their products, action which form part of a standard war. A journalist's analysis of the competing standards may influence the perceptions and interpretations of the audience. In addition, the media influences the relationship between institutional entrepreneurship in standard wars and its network effects and its product performance. The media may also intervene in the relationship between the resources of institutional entrepreneurs and institutional entrepreneurship itself in a standard war. In this way, the media is not directly involved in standard wars but has the power to influence them, because it can influence the interpretation and perception of their audience.

In a sense, the media does not have a direct stake in standard wars. They have no interest in and cannot directly influence the institutional entrepreneur's R&D activities and their marketing and promoting actions. On the other hand, institutional entrepreneurs are eager to tap into media power in their discursive activities. The media has to stand in a neutral position in their daily news reports. Excluding commentaries (editorials, columns, reviews, and so forth), the media has to balance their stories to report both voices. However, CEOs and top executives can actively influence the behavior of information intermediaries and other external constituents by engaging in interpersonal processes toward influencing journalists (Westphal & Deephouse, 2010). Drawing on social exchange perspective, when someone receives a personal favor, he or

she feels socially obligated to return it (Cialdini & Goldstein, 2004). Further, the perspective indicates that reciprocity has affective basis. Hence, CEOs and top executives can motivate positive affect by means of interaction with journalists. People tend to feel gratitude toward those who provide them with socio-emotional benefits (Flynn, 2005). On the other hand, reciprocity has an instrumental basis. The instrumental basis for reciprocity is to increase the likelihood of receiving benefits in future interactions. For instance, top managers can use the firm's advertising budget to influence journalists who can do some favors for the firm in the future. Hence, the use of advertising budgets can be viewed as a strategy to influence media reports. Hence, drawing on the instrumental basis, Top managers can properly use their media budget to provide favors to in an instrumentally motivated effort to influence the way the various events in the standard war is being presented and interpreted in the media.

In general, using the original conceptual framework outlined in Chapter 5, this study has discovered several new categories, including 'human resource management of core employees', 'the social capital of core employees', and 'media influence'. It also modifies the framework, including the relationship between collective action and discursive activities, and suggests that there is only weak evidence for the relationship between product performance and network effects. This will be discussed in detail in Chapter 8.

Chapter 8. New Theoretical Framework, Discussion, Limitations, and Future Research

In this chapter, the theory built from the empirical data is presented in the form of a new theoretical framework. Following the data analysis, the topics of human resource management and social capital of core employees and the influence of the media are added to the original conceptual framework. The original framework is the main body of the new theoretical framework. The findings from the media reports and the interviews were used as means of elaborating the existing framework, apart from where this concerned the relationship between product performance and network effects. I attempted to do more research in the Euromonitor database to find other figures which could elaborate this relationship, but it proved impossible to do this.

According to the findings, the case study portrays Sony as ‘heroic change agent’ (Powell & Colyvas, 2008; Lawrence, Suddaby, & Leca, 2009) or overemphasizes Sony as a rationalistic changing agent. Indeed, the study may give a concluding image of the successful institutional entrepreneur is easy to live up to. Today, in contrast, scholars are paying more attentions to the concept of institutional work, referring to the purposive action of individuals and organizations aimed at creating, maintaining, and disrupting institutions. Rather than a specific social actor, the concept suggests that every social actor is capable of creating, maintaining, and disrupting institutions in daily life.

However, this study suggests that heroic agent is not capable of solving everything in institutional entrepreneurship. Firstly, even in a mature field, heroic agents may face

unexpected events and make mistakes at all time. Because, they are human beings. Although they have bounded rationality, they still have knowledge and the capacity of reflexivity as well. They are capable of learning the new think from the experience and further adjusting their actions in the future. Thus, trial-and-error may happen to heroic agents in institutional entrepreneurship. Secondly, even a mature field has only one dominant institutional logic, it does not mean that the institutional logic could dominate everything. Otherwise, this study, the BD case using institutional entrepreneurship perspective, will not exist. Consequently, the key point should not be put eyes on whether or not Sony was a rationalistic or heroic agent in the standard war. Rather, the study suggests how institutional entrepreneur is capable of ‘shaping’ the outcome towards a success.

I will firstly show how the findings elaborate the original conceptual framework in Section 8.1. More importantly, the section will directly answer the research questions proposed in Chapter 1. Section 8.2 presents the new theoretical framework, and demonstrate what I established on the basis of the original framework. I will then briefly present the new model. In the succeeding sub-sections, I will discuss the existing body of theoretical work concerning these ideas and connect it to the empirical data from this case. The following section (Section 8.3) has two sub-sections. The first sub-section discusses the analytical propositions of the study, while the second compares and contrasts it with existing studies, including studies of standard wars and institutional entrepreneurship. Section 8.4 discusses the limitations of this study. Finally, Section 8.5 will discuss possible future studies. Based on the findings of this study, I propose that studying the changing practices of institutional entrepreneurs using a configurational

approach, and studying the role of social capital in institutional change processes both have potential for future research.

8.1. The Response to the Research Questions

By using critical stakeholders management capabilities, collaboration structuring capabilities and discursive activities, yes, organizations may defeat its competitors in standard wars. The findings show that the power and legitimacy of institutional entrepreneurs can be viewed as important resources in the implementation of standard wars. In the literature review, I suggest that institutional entrepreneurs gain a certain amount of power and legitimacy as a result of having crucial positions in networks and social relationships. Further, I suggest that effective power and legitimacy lead to the collective actions and discursive activities of institutional entrepreneurs. Both Sony and Toshiba chose critical stakeholders in order to motivate other prospective organizations to engage in their projects. For this reason, they adopted the same partner selection strategies. Geringer (1988) suggests that the optimal partner in collaborations should be comparable in sophistication, be of a similar size, and have goals which fit with those of institutional entrepreneurs. The findings show that both Sony and Toshiba put a great deal of effort into attracting such critical stakeholders to join their camps.

This study also establishes that several constructs lead to the collective actions and discursive activities of institutional entrepreneurs. These constructs are: networking with critical stakeholders and core employees, experience of previous standard war, main business segments of critical stakeholders, and performance of star products of institutional entrepreneurs. Comparing Sony's and Toshiba's strategies shows that their

different levels of power and legitimacy contributed to the outcome of the standard war. In other words, Sony may successfully convince critical stakeholders and prospective organizations to engage in the BD camp. Sony had also valuable experience of previous standard wars, even though it had lost those wars. Although Sony had a strong position in the relevant industries and strong support (Deephouse & Suchman, 2008), other prospective organizations initially ignored the importance and influence of the BD standard, and chose to support Toshiba's HD DVD standard.

In contrast, Toshiba had also strong support (from the DVD Forum), similar experience of previous standard wars, and an established position in the relevant industries. However, it failed to make the audience believe that the HD DVD standard was better. Thus, although it had first mover advantage, Toshiba was defeated in this standard war. This study shows how the institutional entrepreneur can use its resources of power and legitimacy to enact efficient collective actions and discursive activities.

Following the previous section, this study shows how collective action (critical stakeholders management and collaboration structuring capabilities) and discursive activities should be managed in a standard war. In general, yes, these findings also answer the three sub-research questions proposed in Chapter 1.

This study defines these activities as core concepts and as gaps in the existing studies of standard wars. By reviewing the literature, I show that the role of stakeholder and the importance of critical stakeholder have been ignored. It is a gap in standard war studies which needs to be filled. Following the literature review, I argue that the role of critical stakeholders should receive more attention in studies of institutional entrepreneurship

and standard wars. Institutional entrepreneurs need specialized practices (i.e. critical stakeholder management capability, including understanding expectations, responding to requirements, seeking exclusive support and giving incentives) to manage their relationships with their critical stakeholders. On the other hand, generalized practices (collaboration structuring capability, including the portfolio of institutional entrepreneurs, membership structures, R&D activities, organizing promotion, and frequent communication) are used by institutional entrepreneurs to manage collective actions involving all member organizations (including critical stakeholders). These include establishing membership structures, assigning missions to different member organizations, establishing unambiguous discursive strategies and appointing spokespersons. Institutional entrepreneurs use these generalized practices to structure hierarchical collaborations in standard wars. Having collaborations with critical stakeholders as well as a large number of member organizations, institutional entrepreneurs use a hierarchical membership structure to manage their actions and obligations. Both Sony and Toshiba established widespread collaborations in relation to research and development of the specifications of their new technologies. However, according to media reports, Sony had better outcomes in terms of R&D activities, promotion and internal communications than Toshiba. To summarize, this study not only fills a research gap related to stakeholders and critical stakeholders but also proposes several practices for the management capability.

This study also highlights the strategies used by institutional entrepreneurs when managing discursive activities. This is another gap should be filled in the relevant studies. In Chapter 3, I used discursive activities to integrate the role of framing. Following the findings, I replaced the role of framing proposed by social movement

studies with ‘framing’ in discursive activities, which are analyzed in this study. To some extent, the role of ‘framing’ strategies in this study replaces the diagnostic and prognostic framing proposed by previous works (e.g., Battilana et al., 2009; Markowitz, 2007; Misangyi, et al., 2008). I identify four further strategies in standard wars: ‘promoting’, ‘debating’, ‘undermining’, and ‘use of spokespersons’. These strategies further illustrate the ways in which institutional entrepreneurs devise and promote unified discourses and information to competing firms throughout standard wars. In this way, the lack of research into framing and discursive activities in the existing standard wars studies can be remedied.

In order to decrease information asymmetry, communicate information, and construct meanings for external groups, both Sony and Toshiba devised various discursive activities. Collective actions and discursive activities are interrelated, as is shown by information from the BDA. The BDA’s promotion committee and its spokespersons were responsible for initiating promotional strategies, and for constructing an unambiguous voice. In order to ensure that there was only ‘one voice’, the BOD of BDA had the right to review every single promotional strategy. From the limited available information about the HD DVD camp, it appears that the HD DVD camp did not have the same function in relation to its promotional committee and promotional sub-groups. Several events indicate that effective discursive activities were able to motivate prospective organizations which initially supported the HD DVD standard to change their minds, and also to increase the commitment of BDA members. The findings therefore show that discursive activities may facilitate the collective actions of institutional entrepreneurs. In addition, an outcome of Sony’s collective actions and

discursive activities was a further accumulation of their power and legitimacy that can be used in the standard war.

Finally, studies of standard wars and technology entrepreneurship emphasise efforts to increase network effects and improve product performance. In the literature review, I suggest that institutional entrepreneurs may increase and enhance network effects and product performance by means of effective collective actions (including critical stakeholder management) and discursive activity. I originally proposed that effective product performance can lead to network effects. However, due to limitations in the data, I was unable to verify this causal relationship.

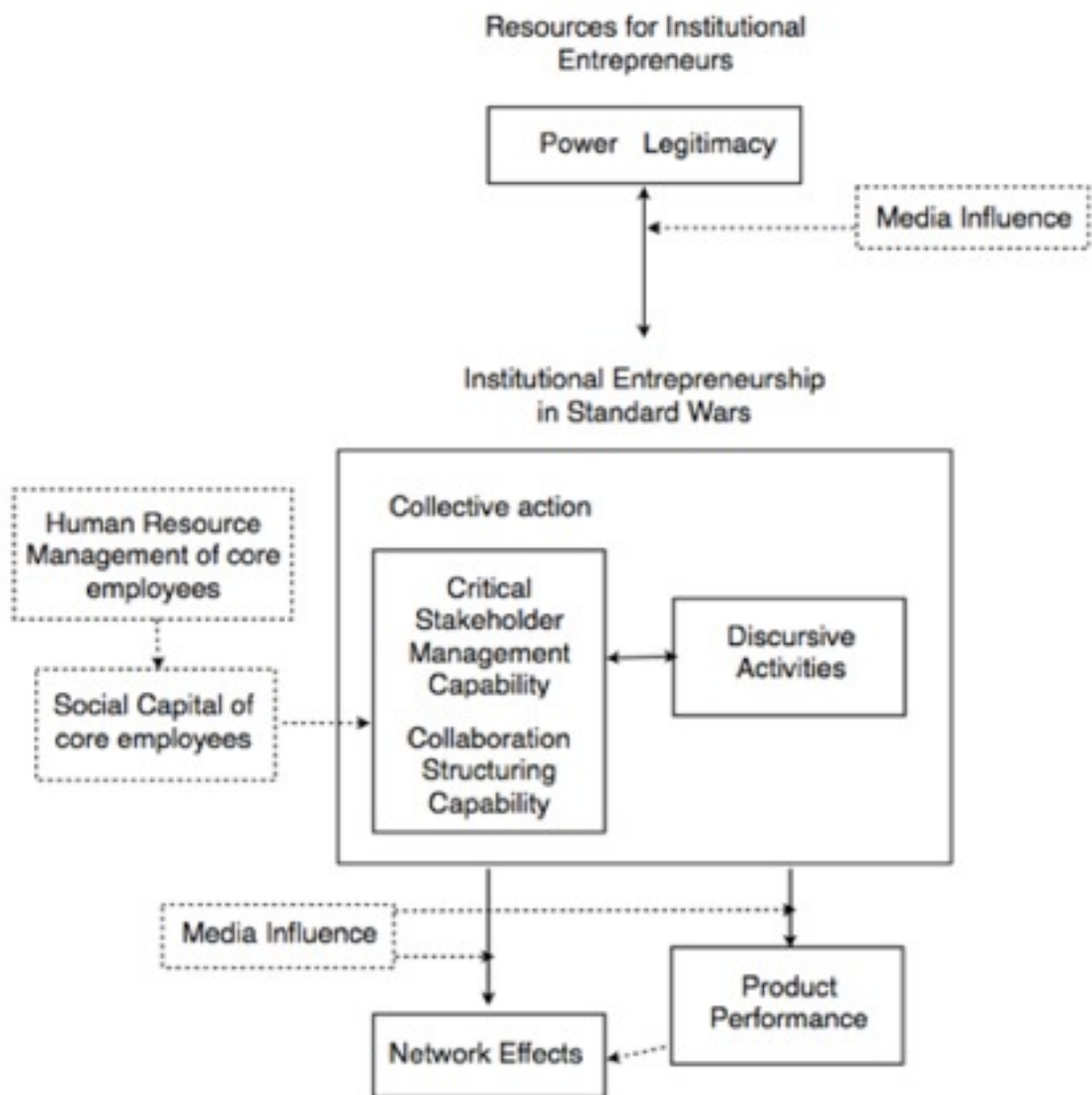
Existing standard war studies show that a specific new technology can generate greater network effects by having more member organizations which are capable of producing complementary products. Furthermore, this study suggests that effective collective actions (critical stakeholder management and collaboration structuring capabilities) may lead to better product performance which satisfies the requirements of critical stakeholders and the public (examples of this include BD standard's copyright protection and the marketing war between Sony PS3 and Microsoft Xbox 360). Moreover, effective discursive activities in marketing campaigns can also lead to (perceived) better product performance. In this vein, the findings of this study match those of Suarez (2004) and of Kaplan and Tripsas (2008).

To summarize, yes, the research questions are answered by the findings in this study. Organizations may defeat their competitors in standard wars by using critical stakeholders management and collaboration structuring capabilities (collective action)

and discursive activities. The study also suggests what practices should be used in the processes. The study figures out that collective action have inter-relationship with discursive activities. Hence, the findings also suggest that using discursive activities to external groups does not contradict with collective action but enhance the commitment of internal group members. They study may not only respond the empirical findings of previous studies but also fill the research gaps (critical stakeholder management and discursive activities and their practices used in the process), although the relationship between product performance and network effects is not derived from the data. However, several new categories are based on the data. The next section integrates these new categories within the original framework and allows a new research-based theoretical framework to emerge.

8.2. The New Theoretical Framework

Figure 8.1 The New Theoretical Framework



Source: Author

Figure 8.1 illustrates the new theoretical framework which integrates new findings from the case study. The solid line represents the main findings from the original framework proposed in Chapter 5. As discussed in the beginning of this chapter, the study originally proposed that product performance leads to network effects, although, due to data limitations, this relationship could not be validated. The new framework therefore replaces the solid line with a dotted line. Chapter 5 also placed critical stakeholder

management and collective actions together in a dotted square. As a result of the data analysis, they have been replaced by ‘critical stakeholder management capability’ and ‘collaboration structuring capability’ (collective action). The dotted square is therefore replaced by a solid square, showing that the roles of these concepts are confirmed by the case study.

The new framework integrates several additional findings. Firstly, human resource management of core employees may influence the collective actions of institutional entrepreneurs through the social capital of these employees. For institutional entrepreneurs, core employees are a source of organizational competitive advantage, and so institutional entrepreneurs should nurture them in their organizations. HR practices should help them to establish their own social capital. In this way, institutional entrepreneurs can use their social connections to promote their new standards.

Secondly, the influence of the media may intervene in the relationships between the actions of institutional entrepreneurs (collective action and discursive activities), their resources (power and legitimacy) and outcomes (network effects and product performance). The study suggests that media organizations are indirect stakeholders in standard wars. Their analyses and product reviews may influence the interpretations of the audience. In the following sections, I will discuss these new findings in detail.

8.2.1. Media Influence

In the context, media influence refers to situations in which the media uses its reports to directly or indirectly influence the audience’s understanding and interpretations of a

specific event or artifact. Discursive activity, as defined in this study, on the other hand, refers to activities by the institutional entrepreneur which convey information to audience and influence their interpretations of their standards. In contrast, the media analyses and reports the actions of competitors and reviews their products. These reports may not be intended to be discursive activities which directly influence the outcomes of standard wars. However, they do so indirectly by influencing the interpretations of the audience. Accordingly, they can be seen to intervene in the relationships between institutional entrepreneurship and product performance, network effects and resources.

Media influence is categorised in studies of media effects. The tradition of media effects research occupies a highly dominant and influential role within mainstream mass communications research. It is unquestionably the longest-running tradition within the field of audience studies (O'Neill, 2011). This section will briefly introduce the development of media effects research.

The research tradition originally focused on the impact of the mass media on society. It was represented historically by the prevailing view of a powerful media which exercised direct and powerful effects on relatively powerless audiences. This approach assumed to some extent that the mass media were so powerful that they could insert their messages into the audience's minds or that advertising messages could be precisely targeted at audiences like bullets.

The second phase of communication research opposed this idea of a powerful media and supported the notion that it had only limited or indirect effects. Katz and

Lazarsfeld's (1955) *Personal Influence* was one of the most influential books in mass communication research. It proposed that the effects of the media are diffused through opinion leaders who explain and diffuse media content to others. This approach placed new emphasis on human agency in the process of media effects. Katz and Lazarsfeld (1955) claimed that the impact of the media was limited by key social actors within social networks who mediated the flow of information from it. In this way, the influence of the media is more likely to be one of reinforcement than of direct influence.

Following the two-step flow theory, many different approaches to studying the effects of the media have been developed. Instrumental actualization (Kepplinger, Donsback, Brosius, & Staab, 1989) is one of these approaches. It is the first approach to explain the effect of journalists' opinions on new content. The basic assumptions are that journalists hold their own opinions and share their values, and that journalists determine that most events have an inherent conflict-related valence. This means, they support one side against the other. Journalists continually use complementary approaches to news selection, such as gatekeeping, news factors and news values. Instrumental actualization is therefore one of the media's roles in public life. Audiences rely on media to transform information about a considerable number of effects into a manageable number of media messages. This process determines not only which information is selected but also the nature and content of messages, such as news (Shoemaker & Vos, 2009).

As the previous sections demonstrate, media such as television and the internet play a critical role in directly influencing the minds of the audience. Their influence is also mediated by a nexus of factors, such as opinion formers (like leading users). In news

selection processes, journalists also decide which information should be presented to their audience.

In this study, I have established that critical stakeholders play a critical role in processes of institutional change. In contrast, the media can be viewed as indirect stakeholders, or, in other words, these stakeholders who interact with critical stakeholders and can influence the projects, even though they are not directly involved in them. They directly influence some perceptions of the audience, and also influence the minds of opinion formers. They influence other consumers through personal connections, and select particular messages which then become media messages. According to the stakeholder typology proposed by Mitchell et al. (1997), indirect stakeholders do not have enough legitimacy to become involved in the standard war. They also, obviously, do not have any urgent requests for the institutional entrepreneurs.

Sony and their critical stakeholders had highly interdependent relationships. The PS3 and BD standard served as a kind of platform for introducing game and movie titles to consumers. The focal firms could rapidly manufacture their products, ship the disc players to stores and then increase the network effects. On the other hand, the media had indirect stakeholder relationships with focal firms. Their activities may not directly have affected the outcomes of the standard war. However, the media did intervene in the actions of focal firms. Intervening positively, they helped the focal firms to communicate information and construct meanings to audience. However, they also may have generated negative impressions which were not approved by focal firms. For example, at the end of the standard war, some media reported that the HD DVD player had been hacked. Media reports also influenced the perceptions of Time Warner

shareholders. This forced the firm to boost its DVD sales, and the CEO suggested that Warner Brothers should choose the BD standard over the HD DVD. For these reasons, the media are conceptualized in this study as indirect stakeholders which may influence the processes of standard wars.

To summarize, the media may influence the audience in standard wars, where the audience includes critical stakeholders, member organizations, prospective consumers and competitors. In the new theoretical framework, the influence of the media is seen to intervene in the relationship between institutional entrepreneurs and the audience in standard wars.

8.2.2. Human Resource Management of Core Employees

This is another new finding in the study. However, it is merely a tentative one. According to my Japanese interviewee, Sony, Panasonic, and Phillips have master engineers separately. The role of these engineers shows the importance of interpersonal network in the standard war. However, there are no media reports validating this point, and further interview with these engineers was not possible. Researching a PhD thesis is a learning process. Although there is no sufficient evidence to support the importance of the master engineers, due to my education background, I strongly sense that this could be critical in standard wars. This study suggests that good human resource management (HRM) of core employees can help them to create their own individual social capital which will benefit the collective actions of institutional entrepreneur.

The relevant HR practices are categorised as strategic human resource management (SHRM). It covers the HR strategies which are adopted by companies across their entire business, and attempts to measure their impacts on the firm's performance, including financial and behavioral performance (Boxall, Purcell, & Wright, 2007). SHRM emphasizes human capital contributions, strategic capabilities and the competitive performance and advantages of an organization (Lengnick-Hall, Lengnick-Hall, Andrade & Drake, 2009, Barney, 1991). Apart from resource-based and human-capital views of the firm and its strategic contributions, Leana and Van Buren (1999) were the first researchers to explore the role of SHRM in creating social capital. They defined organizational social capital as a resource which reflects the character of social relations within the firm. For this reason, employment practices that promote stable relationships and strong norms create organizational social capital, which itself yields benefits. Further, Collins and Clark (2003) examined the social networks of senior management teams as sources of organizational competitive advantage in high technology firms. They used a sample of 73 technology firms, and their results supported their predicted relationships. The social networks of core employees mediate the relationship between HR practices and firm performance (sales growth and stock performance).

Firms can use core employees to obtain mutual investment and benefits by using trust and relationships with external partners (Kang, Morris & Snell, 2007). In the case of the facilitators, the masters were core employees who possessed valuable and firm-specific human capital which provided the core knowledge base. The knowledge base is a primary source of competitiveness. The critical engineers provided the foundation for these firms' core competencies (Grant, 1996). In this standard war, Sony and the other facilitators exchanged new knowledge across organizational boundaries (Kang et al.,

2007). These knowledge flows may facilitate interorganizational learning by expanding, refining, and modifying the stocks of knowledge of the firms.

The social capital of core employees facilitates institutional entrepreneurship within standard wars in at least three different ways. Firstly, the core employees may use their weak and non-redundant social ties (Granovetter, 1985) to obtain entrepreneurial opportunities by means of identifying and utilizing novel information or knowledge from a variety of sources. Secondly, the relationships in which core employees are involved may become characterised by dyadic trust, which refers specifically to trust between two parties who have direct experience of each other (Lewicki & Bunker, 1996; Portes, 1998). Dyadic trust may facilitate knowledge sharing and exchange with others who have had experiences with core employees or the focal firms. Finally, shared component knowledge, which refers to the knowledge of specific parts, rather than the whole (Henderson & Clark, 1990), allows core employees and their relational partners to better understand and interpret new knowledge.

Consequently, having HR practices towards core employees may be important. For example, Reagans and Zuckerman (2001) suggest that flexible work structures can help to facilitate diverse and transitory connections among core employees and their partners by using temporary project teams and assignments. Snell and Youndt (1995) suggest that firms can use result- or output-based systems to manage and reward the performance of these flexible work systems. This is because the activities of core employees may involve exploratory and/or entrepreneurial actions. It is difficult to measure their performance using pragmatic routines and job outlines.

To summarize, the study suggests that human resource management of core employees (eg. the three master engineers) can be extrapolated to form part of the emergent theoretical framework based on my theoretical sensitivity. By means of good human resource practices in relation to their core employees, organizations are more capable of using their connections with other engineers in other organizations to create value and exploratory learning capability, and to establish dyadic trust and common understanding of new technologies. In this way, individual social capital may be caused or stimulated by institutional entrepreneur's HRM of core employees.

8.3. The Conclusions of the Study

This section will present the conclusions of the study, and compare and contrast them with previous studies. Section 8.3.1 will outline the main conclusions of the study, giving four points which show how concepts from institutional entrepreneurship research can contribute to an understanding of how standard wars are won. Section 8.3.2 will compare and contrast these conclusions with previous studies of standard wars and of institutional change.

8.3.1. Conclusions: Analytical Propositions

Based on the analysis and theoretical framework, this section will present several analytical propositions. They will suggest connections between two or more of this study's critical concepts.

1. The profiles of critical stakeholders change over time. Deliberately selecting and coordinating critical stakeholders in collaborations may result in positive outcomes for institutional entrepreneurs in standard wars.

In standard wars, the attributes of critical stakeholders may change over time. At an early stage, institutional entrepreneurs choose to cooperate with critical stakeholders with whom they have high relational closeness and collaborative R&D activities. At this stage, the basis, specifications and blueprints of new technologies are determined appropriately. Institutional entrepreneurs are able to use their existing achievements in these areas to persuade other critical stakeholders and prospective organizations that the new technologies they are developing are achievable and appropriate to their interests. At a later stage, when these new technologies are presented to the market, institutional entrepreneurs choose to cooperate intensively with critical stakeholders with complementary products. At this stage, technical specifications are finalized. The main task is to promote the finished products to the markets as quickly and in as large quantities as possible. In the BD-HD DVD case, disc players needed many complementary products and services, so other stakeholders became critical at this stage. Content providers (such as Hollywood studios, game software developers and publishers), as well as retailers had stakes to Sony and Toshiba at this stage.

Thus, before they engage in standard wars, institutional entrepreneurs have to decide which critical stakeholders to invite into their collaborations. The advantage of this is that these critical stakeholders are then able to express their expectations and exchange opinions about the development of new technologies within the collaboration. They gain an understanding of each other's requirements, and then achieve agreement. In

turn, the developers of specifications are more likely to turn these agreements into technical specifications. Manufacturers of complementary products are then willing to put more effort to producing such products.

Throughout this process, institutional entrepreneurs make efforts to secure the support of exclusive critical stakeholders. One of the ways of achieving this is to provide them with various incentives to reinforce their commitment. Institutional entrepreneurs may ideally choose critical stakeholders who, to a certain extent, have prior relationships and mutual understanding. In this way, they can save time and other costs in terms of the development of new technological specifications.

In conclusion, this study indicates the importance of the ways in which institutional entrepreneurs manage their relationships with critical stakeholders. In the BD-HD DVD case, both Sony and Toshiba invited many critical stakeholders to engage in close collaborations and become symbiotic members. Both focal firms intended to engage these stakeholders in a process of shared common fate in this standard war. If such a process is successful, critical stakeholders may put more effort into the standard war. On the other hand, institutional entrepreneurs may also suffer considerable loss in such processes. In this case, when Microsoft and Toshiba opened the copyright protection mechanism, the HD DVD camp lost some content providers. The news about the hacker also showed that the HD DVD standard could not provide effective copyright protection to content providers. It follows that if institutional entrepreneurs betray critical stakeholders or break their agreements with them, the cost could be considerable (Ford & Ford, 1995).

2. Well-structured collaborations may result in positive outcomes for R&D activities of technical specifications and promotional campaigns in standard wars.

Institutional entrepreneurs use collaborations to manage the actions of members, such as critical stakeholders and other member organizations. Collaborations are capable not only of researching and developing technical specifications but also of promoting products in markets. Institutional entrepreneurs strive for symbiotic partnerships with critical stakeholders. They have high levels of communication frequency, mutual trust, emotional intensity and reciprocal service (Granovetter, 1985). The number of general member organizations is much higher than the number of critical stakeholders. These members can further help the development of technical specifications and promotion of new products.

In order to sufficiently manage the actions of members and assign responsibilities and obligations to them, institutional entrepreneurs structure hierarchical collaborations. They establish generalised (weak) ties with general members. General member organizations are connected to a concrete issue in a specific way. They generally follow strategies, rather than defining them, which is the responsibility of institutional entrepreneurs and critical stakeholders. However, they also have the right to contribute to action plans concerning the development new technologies, although these contributions must be approved by the critical stakeholders. On the other hand, institutional entrepreneurs tend to have particularized (strong) ties with critical stakeholders. These ties involve routines, procedures, and structures that delineate who attends particular meetings and who can legitimately make decisions or speak on behalf of the collaborations (Hardy et al., 2005). Accordingly, the establishment of hierarchical

collaboration structures echoes the findings of network studies. Scholars suggest that a high-performing network structure often consists of a mixture of strong and weak ties (Uzzi, 1997; Ozcan & Eisenhardt, 2009).

In standard wars, collaborations are also capable of promoting products to markets. In consumer electronics industries, consumer adoption determines the degree of network effects of new technologies. The other aim of collaborations in standard wars is therefore to deliver unambiguous information to prospective organizations and consumers. This information gives prospective organizations a clear understanding of the development and content of the new technologies, while also giving consumers a favorable understanding of the value and advantages of new products. Collaborations are important for the development of promotion plans in order to increase adoption and network effects. Institutional entrepreneurs and their partners ensure that their promotional plans correspond to the content of new technologies. This is important in order to avoid presenting divergent information and constructing confused meanings of new technologies to prospective organizations.

3. Unambiguous information within collective actions and discursive activities may result in positive outcomes for the audience of the institutional entrepreneur.

In standard wars it is important that correspondence exists between the technical development of the standard and the activities which promote the standard to various audiences. Institutional entrepreneurs are capable of managing discursive activities. These activities communicate information about new technologies and construct their meanings to the audience, who may be internal group members or external groups. The

aim of these activities directed at external groups is to make them believe that the specific technologies or products are better than those of their competitors and, as a consequence, make them adopt or purchase products using the new standard. These activities take different forms. For instance, the term ‘undermining strategy’ refers to discourses which are intended, implicitly or explicitly, to erode or impede the base or foundation of a rival standard and collaboration. By using discourse activities, institutional entrepreneurs attempt to make the audience believe that their new technologies are better than those of their competitors. Institutional entrepreneurs tend to construct the evidence and then convey its hidden meanings to their audiences. On the other hand, the performance of discursive activities for internal group members is intended to enhance their commitment to collaborations. This study suggests that the use of discursive activities aimed at external groups will also produce effects on internal group members. By using the media to convey information, not only external groups but also members of internal groups will observe the actions and policies of institutional entrepreneurs, and understand whether they correspond with earlier ones. If this is not the case, they will reduce their commitment to their collaborations, and then devote fewer resources to the change projects.

It is therefore crucial for the institutional entrepreneur to ensure that its discursive activities present an unambiguous voice to all of the four groups that constitute its audience: its partners, the prospective organizations in the rival camp and other independent organizations, leading users and the general public. Firstly, this make it easier to increase the collaborative commitment of partner organizations who require a clear and credible understanding of performance, future prospects and other critical issues which relate to the future of the collaboration. Secondly, prospective

organizations are motivated to engage in the projects of the institutional entrepreneur when an unambiguous voice convinces them that the development and specifications of new technologies correspond well with their expectations. Thirdly, there is a greater chance that consumers are convinced to purchase a specific new technology if they receive unambiguous information that the technology has a better product performance than those of its rivals.

To sum up, this study suggests that, in order to generate an unambiguous voice, institutional entrepreneurs must use discursive activities strategically to frame, promote and discuss their standards, and to undermine those of their rivals. In addition, institutional entrepreneurs should use skilled spokesmen to ensure an unambiguous voice in communications with other companies and markets. In the BD-HD DVD case, the spokesmen had a critical role in the standard war. This is because changing and influencing the interpretations of the audience are not easy tasks. Using skilled spokesmen to consistently express unified information throughout a standard war makes it more likely that the audience will interpret the meaning of the new technologies in this way.

4. The power and legitimacy of an institutional entrepreneur result from the possession of strong positions in industrial networks and sufficient experience in standard wars. The outcomes of its collective actions and discursive activities may result in the accumulation of power and legitimacy.

When an institutional entrepreneur initiates change projects in its industries, its activities are more easily understood and appreciated by other organizations in the

relevant industries if its previous product performance is outstanding and if it is a leader in the relevant business segments. Its previous performance and standing provide the institutional entrepreneur with power and legitimacy which can be utilized to gain the attention of prospective organizations and the media, and to establish collective actions and discursive activities.

This then make it easier for the institutional entrepreneur to further accumulate power and legitimacy from other organizations. If they believe that the new technologies match their expectations and interests, they are more likely to invest their own resources in the institutional entrepreneur's change projects, to invest in collaborative R&D activities with institutional entrepreneurs, express supportive opinions of specific new technologies, and so on. Such investments may further accumulate the power and legitimacy of the institutional entrepreneur. If they have increased power and legitimacy, institutional entrepreneurs can further motivate other prospective organizations and critical stakeholders to engage in collaborations and establish discursive activities.

In the BD-HD DVD standard war, both Sony and Toshiba were leading companies in their industry. However, the findings of this case study do not necessarily imply that organizations which have a less dominant position and less successful existing products in their industries will not be able to initiate and win standard wars. Such peripheral organizations often have a stronger economic interest than established firms in initiating an institutional change project linked to a technological innovation (Garud et al., 2002; Haveman & Rao, 1997; Hirsch, 1986; Kraatz & Zajac, 1996; Leblebici et al., 1991; Tushman & Anderson, 1986). This study indicates that peripheral institutional

entrepreneurs need to establish institutional portfolios with other leading organizations in order to enhance their chances of success. By establishing connections with leading organizations, the peripheral institutional entrepreneurs are able to obtain a certain amount of power and legitimacy by means of association and linkage (Deepphouse & Suchman, 2008).

According to a Chinese proverb, ‘ if you know your enemy and yourself, you can fight a hundred battles without defeat’. Following this precept, firms should have a clear understanding of their advantages and those of their potential competitors before they initiate standard wars. These advantages include the history of the focal firm, its business segments, R&D strengths, and interactions with critical stakeholders. Such advantages are not easy to imitate or find substitutes for (Barney, 1991). If they have such advantages, institutional entrepreneurs may easily gain the attention of critical stakeholders and the media. Furthermore, by understanding the advantages of potential competitors, institutional entrepreneurs may be more able to predict the actions of their competitors. To some extent, a firm’s history and experience will affect its future strategies (Koch, 2011). An organization’s ability to succeed relies on the particular form of strategic path which is inscribed within it. This path strengthens the importance of knowledge of the competitors’ history and position.

8.3.2 Comparison of This Study with Previous Studies

The section 8.3.2 includes two sub-sections. The first section (8.3.2.1) will compare the study with previous studies of standard wars, and show how this standard war differed

from other major standard wars. Section 8.3.2.2 will compare this study with other institutional entrepreneurship studies.

8.3.2.1. Comparison with Previous Studies of Standard Wars

This section aims to concentrate on explaining the story of the BD-HD DVD standard war, and how Sony was able to defeat Toshiba in this war. It will compare this standard war with other major standard wars and show how it differed from them. Generally speaking, collective action (BDA), network effects (PS3), and product performance (consumers and stakeholder-oriented), which previous standard wars studies have examined, were still important in the BD-HD DVD war. Compared to previous standard wars, this standard war demonstrates that Sony defeated Toshiba by doing the following: managing critical stakeholder groups (including Hollywood studios, retailers, PC companies, consumer electronic manufacturers, game developers and publishers), establishing a clear and hierarchical membership structure, creating a resilient portfolio by synthesizing relevant business segments with the standard and with disc players, cooperating with core employees, and taking the importance of discursive activities into account. These demonstrations appears the key assets of the key assets of standard wars.

Firstly, the BDA presented a clear and hierarchical membership structure in order to coordinate, cooperate, and manage the interests and opinions of its various stakeholders in a single collaboration. This led not only to stronger and more consumer-oriented technical performance (eg. video and audio) but also better stakeholder-oriented criteria (eg. copyright protection, capacity and production costs). It appears the importance of reputations in standard wars. Greenberg (2008) indicates clearly that collaborations and

product performance are the key areas in which VHS defeated Betamax. Hollywood studios chose the VHS standard over the Betamax standard because its greater capacity could decrease costs and save space for retailers. Echoing this point, the capacity of an optical storage device was also the critical issue in the BD case of BD. However, in the digital era, production costs and product price are less important than copyright protection. In the case of BD vs. HD DVD, although Toshiba's low production costs attracted greater attention from stakeholders at the beginning, having a better copyright protection mechanism was ultimately more important for its stakeholders.

Secondly, the master engineers of Sony, Panasonic and Philips used their credibility to demonstrate to other organizations the trustworthiness of the BD standard. It appears the importance of not only reputation but also brand names in standard wars. In the VHS vs. Betamax case, collective action was the other critical factor which produced network effects (Greenberg, 2008; Shapiro & Varian, 1999). It clearly demonstrates that an individual organization cannot beat its rivals without widespread support. This study further demonstrates that core employees can play critical roles in a standard war. In the BD case, three core employees, the master engineers, were instrumental in organizing collaborations which developed the primary specification of the BD standard. Their actions further influenced the perceptions of other organizations that the BD standard was trustworthy.

Thirdly, Sony PS3 not only generated widespread network effects but also synthesized BD players and other complementary products (movie titles and game softwares). Previous standard wars studies have demonstrated the importance of network effects and how they are linked to collaborations. It appears the importance of controlling over

an installed base of consumers. For example, Clements and Ohashi (2005) suggest that many technological products exhibit network effects, in which the value of the product to customers increases with the total number of users. Their study of the U.S. video game market shows that establishing links with more games publishers and developers means that more complementary products (i.e. games softwares) can be produced and that network effects can then be produced in the market. According to Besen and Farrell (1994), network effects can be viewed as a demand-side economy of scale. This means that, since the purchase decisions of buyers are strongly influenced by their forecasts of future sales, “there can be large rewards to affecting these expectations” (Besen & Farrell, 1994:118). Thus, in their viewpoint, an inferior product “may be able to defeat a superior one if it is widely expected to do so” (Besen & Farrell, 1994: 118). (See also Farrell & Saloner, 1985, 1986; Katz & Shapiro, 1986, 1994; Krugman, 1991). Besen & Farrell also state that the main reason for the initial success of Microsoft’s MS-DOS was not any technical superiority, but rather that it was supported by IBM.

Fourthly, Sony deliberately created a group of critical stakeholders (Hollywood studios, retailers, PC companies, consumer electronics manufacturers) in this standard war. It appears the importances of intellectual property rights and ability of continuous innovation in standard wars. Both Sony and Toshiba gave financial incentives to their critical stakeholders. These critical stakeholders possessed the physical and symbolic resources which Sony needed. Having these symbiotic partners, Sony were able to rapidly theorize the specifications of the standard and promote the product to the market through the standard war. This study explicitly discusses the role of critical stakeholders in the standard war. Other studies only cover this aspect implicitly, although they emphasise the importance of collective action. For instance, Garud et al (2002)

document how Sun established a group of stakeholders in the beginning of their standard war, but then kept openly inviting other companies to join the camp. For example, in 1995, they announced that their vendors' alliance included IBM, Oracle, AT&T and Intel. At the end of 1996, their list of Java licensees had grown to over a hundred vendors. Although they did not establish a formal collaboration like the BDA, Java's licensing mechanism continued to recruit more companies and independent developers to the Sun camp. In other words, Sun kept accumulating and enhancing the strength of its collective action strategies in this standard war.

Fifthly, Sony and Toshiba were both aware of the importance of discursive activities to both internal group members and external groups. It appears the importance of communicating advantage in standard wars. In their standard war, both companies constructed clear meaning to their stakeholders step by step. Sony successfully used spokespersons to present an unambiguous voice to its audiences. The study shows that the media can be seen to intervene in the relationships between institutional entrepreneurship and product performance, network effects and resources. As in the BD case, other studies also show the importance of discursive activity. For example, Munir and Philips (2005) stress the role of discursive activity in their study of 'Kodak's moment'. They view Kodak's main achievement in its standard war as the way they changed the meaning associated with the roll-film camera. Before Kodak introduced the camera in 1882, taking a photograph was a complex procedure. In the 19th century, it was a 'professional' activity and an 'upper class' hobby. However, Kodak successfully linked the new standard with a new meaning for the camera. Firstly, they linked the camera with the meaning of 'holiday'. Munir and Philips claim that in its discursive activities, the idea of vocation was transformed to the point where people reflexively

understood that ‘a holiday without a Kodak is a holiday wasted’ (p.1673). Secondly, they broke the gender divide in photography, by using the camera to symbolize the modern, adventurous independent female who was soon to become the company’s central image. Finally, they linked the meaning of the camera with ‘family memory’, and successfully changed the public’s association of taking photographs from ‘professional, male, and upper class’ activities’ to ‘holiday usage, family memory, and female can-do’. It was also true in the BD vs. HD DVD case that discursive activities were crucial in the process of associating meanings with the new standards. Although this case did not produce as clear an advertising slogan as in the Kodak case, Sony and Toshiba clearly constructed their own standards around the meanings of ‘cheaper to produce’ (HD DVD) and ‘safer to use’ (BD). As in the Kodak case, both Sony and Toshiba constructed clear meanings to their stakeholders in a step-by-step way. They used many types of discursive activities when promoting their standards, undermining the alternative standards of their competitors, and discussing the advantages of their standards. The study also shows that the media can be seen to have intervened in the relationships between Sony and Toshiba and their product performance, network effects and resources.

Sixthly, Sony was aware that they were creating a resilient product portfolio. It appears the importance of manufacturing capabilities and strength in complementary products in standard wars. The Sony BD standard shows that synthesizing different business segments which relate to a specific standard can provide value to both existing and prospective stakeholders. Sony has many different business segments which relate to the BD standard. This study sees their segments and their past experience of relevant standard wars as giving power and legitimacy. This study explicitly stresses that power

and legitimacy can be seen as resources and competitive advantages of institutional entrepreneurs. Leveraging competitive advantages enables a firm to expand, refine and modify its strategies, thereby creating its dynamic capabilities (Teece, Pisano & Shuen, 1997). This differs from previous studies of standard wars, as they either do not mention the role played by these resources or only refer to it implicitly. The “war” metaphor is invoked to describe the competitive interactions between two or more rivals in the industry. In order to confront the dynamic environment of standard wars, focal firms may proactively leverage their competitive advantages in order to achieve their goals. For example, Suddaby and Greenwood (2005) indicate that seeking legitimacy is a critical aspect in processes of institutional change. Their study shows how a Big Five accounting firm used rhetorical strategies to seek legitimacy in its efforts to institutionalise a new organizational form, the multidisciplinary partnership. However, they do not address the fact that effective discursive activity may lead to accumulation of legitimacy. Furthermore, in their study, power is connected to the ability of actors to create new institutions by mobilizing resources, and accordingly, is difficult to observe directly. On the other hand, Lawrence (2008) stresses that the role of power can be observed when agents promote new practices and organizational forms, and standardize technologies. However, these studies only stress implicitly that power plays an essential role. In contrast, this study discusses explicitly not only the ways in which effective power and legitimacy lead to collective action and discursive activity, but also how they can be increased by these actions.

8.3.2.2. Previous Institutional Entrepreneurship Studies

The findings of this study also reflect many critical aspects of previous institutional entrepreneurship studies. Firstly, the study generally echoes Seo and Creed's (2002) view that human beings are reflexive and knowledgeable agents who are capable of initiating and implementing processes of institutional change when they are aware that current institutions generate contradictions. According to Seo & Creed, the praxis of institutional change has three components: (1) the self-awareness and/or critical understanding of social actors about institutional contradictions; (2) the motivation of actors' collaborations through collective understanding of their situations; and (3) collective actions which change those institutions which have contradictions. As they are dependent on leverage of resources and discursive activity, institutional entrepreneurs can then use these resources and strategic actions to enhance and increase the strength of collaborations in processes of institutional change. All three of these components were clearly present in the Sony case.

Secondly, as in other studies of institutional entrepreneurship, communication was critical in the BD-HD DVD case. Both the Java case (Garud et al, 2002) and the Kodak case (Munir & Phillips, 2005) demonstrate the importance of changing the market's understanding and cognition of standards. The current study suggests that institutional entrepreneurs should define the media as indirect stakeholders. According to Fligstein (2001), agenda setting is one of the critical skills of change agents, something which is echoed in this study, which shows that the institutional entrepreneur should be aware of the imprint effect of the media. Institutional entrepreneurs should possess sufficient skills to give the media positive information and then to influence the intentions of

reports. Once such positive information is imprinted on the minds of journalists, it will be more likely to appear frequently in their reports. However, this study also suggests that institutional entrepreneurs should be aware of the dark side of the imprint effect, as a result of which negative information can also frequently appear.

Thirdly, the study specifically indicates that central players are more likely to become institutional entrepreneurs because of their experience and product segments. This is similar to Suddaby and Greenwood (2005), and Greenwood and Suddaby (2006), who highlight the importance of legitimacy for the institutionalisation of practices in the accounting industry. Their study suggests that central players are able to initiate their change projects in cost-saving ways because of the legitimacy and power they have accumulated in the field.

Fourthly, this study connotes that the connections of core employees may be critical in processes of institutional change. Many studies assert the importance of networks, in general terms, but ignore the role played by personal networks. This study found that the personal networks of core employees can help the focal firm to establish the primary specifications of its standard. Core employees can be seen as a source of an institutional entrepreneur's competitive advantages (Barney, 1991). This shows that HRM of core employees is crucial, as will be discussed later in this study.

Finally, this study proposes a perspective on the process of institutional entrepreneurship which is different from Suarez (2004). The role of structuring collaboration and using discursive activities is ignored by Suarez and these activities are continuous and cumulative rather than linked to a specific phase.

In Chapter 2, this study refers to Suarez's model (2004, see Figure 2.1). The model suggests that the process of technological dominance is distinguished by five separate phases. Each phase is triggered by a milestone. The model implies that the focal firms have to complete the tasks in the previous phase and then go to the next one. He also proposes some dominance factors which are crucial for success in different phases (Suarez, 2004, 283). In other words, his model helps the researchers and practitioners to identify what factors should be accounted for in institutional entrepreneurship and what tasks should be completed in different phases of the process.

Based on the findings of the BD case, this study proposes a focus, which is different from Suarez (2004). In the BD case, structuring collaboration (BDA) and using discursive activities are seen as crucial. However, these activities are continuously on-going and cumulative. For instance, when Sony announced the BDF in 2002, the cumulative process of collaboration was begun. In 2002, Sony used the eight organizations as a symbol to promote the primary BD standard. This information constructed a meaning that the standard was endorsed by a number of important stakeholders. In 2004, Sony chose 20th Century Fox as a critical stakeholder to become a member of the collaboration. This was linked to the promotion of the copyright protection mechanism (BD+) of the standard. At the moment, Sony announced that the BDF would transform to the BDA and openly welcomed other organizations to become the member of the collaboration. More and more prospective organizations decided to become the member of the BDA since 2004. Later, in order to promote the PS3, which was integrated with the BD standard, Sony allied with many game software developers and publishers to back up PS3 and the relevant information was announced in many

exhibitions. Finally, since 2006, Sony went back to ally with hardware manufacturers and Hollywood studios to produce the products associated with the BD standard and many complementary products. Sony also kept announcing the relevant information by using discursive activities. In Chapter 7, the findings show that more and more organizations chose to become members of the BDA throughout the process. Sony also continuously used discursive activities to promote the relevant information and construct the meaning of the BD standard to audiences and markets.

To sum up, the importance of structuring collaboration and using discursive activities are ignored by Suarez. The aim of this discussion is not to reject the contribution of Suarez. Rather, it is to complement his model. The phase-specific dominance factors proposed by Suarez are important but other factors (structuring collaboration and using discursive activities) which are continuously cumulated throughout the process of institutional entrepreneurship are also important.

8.4. Limitations of Data

There are two types of data limitation. The first limitation is cultural distance. Japan is seen as a society which is relatively closed (Hofstede, 2007). Japanese culture does not allow outsiders access to internal data and in-depth information about companies and collaborations. I was fortunate to develop a personal connection with a senior manager from Sony, as, otherwise, I would not have been able to obtain some of the information about the BDA used in this study. However, although I had this connection with one senior manager in Sony, he was not able to provide me with access to other senior Sony managers as supplementary informants. In addition, I sent many emails to Toshiba

managers who were involved in the standard war, asking them for information, but I did not receive any replies. I also asked my Sony informant for access to the BDA members' forum but this was not allowed. Hence, the relative closure of Japanese culture constituted a barrier that limited my research to data that was openly available.

In order to deal with this data limitation, I collected as many media reports and as much complementary data as possible (see Table 6.1). The media reports contain many reports and analyses of Sony and Toshiba's business activities, strategies, products and other value information during the standard war. Industry reports (Datamonitor) provided expert analyses and market figures. Statistics from Euromonitor and WIPO provided value information concerning Toshiba and Sony's R&D activities, and the size of the video player and games console markets. Toshiba and Sony's annual reports and their archival data gave opportunities to obtain technical information and other news sources concerning both camps. I triangulated each data source with other sources. For these reasons, I believe that these other data sources can make up for the shortage of information from the companies studied.

The other limitation concerns the availability data in the databases used for the case study. Firstly, due to the limited availability of data, it was difficult to access information about some of the events described in Chapter 7. For instance, in 2005, Toshiba announced that Microsoft had joined their camp. Microsoft then announced that their Vista system would support the HD DVD standard. This joint enterprise came as a major surprise for the PC companies in the BDA. However, Toshiba did not integrate the Microsoft Xbox 360 into the HD DVD disc players. This meant that the game console was not able to act as a trojan horse, in the same way as the PS3. The available

data does not make it possible to explore the reasons for Microsoft's engagement with Toshiba, and why the interests of Microsoft were ignored in relation to the launch of the Xbox 360. Furthermore, after Microsoft had joined the HD DVD camp, HP urged the BDA to adopt the open copyright protection mechanism in the BD standard, as Toshiba and Microsoft had done with their standard,. The BDA officially rejected this proposal, although this did not mean that HP then left the BDA.

Secondly, the study claims that product performance influences network effects in standard wars. However, no data, such as market share figures, proves this viewpoint. The Datamonitor and Euromonitor databases do not contain any specific figures for the market share of BD and HD DVD disc players. An informal website (blu-raystats.com) does exist, which contains weekly and year-to-date market share figures, together with percentage market shares, for the BD and HD DVD players since their inception. However, this website is not part of any official collaboration or group, but is the work of an individual consumer. The FAQs section states that the accuracy of its statistics cannot be guaranteed. It mainly cites relevant statistics from Nielsen VideoScan and data presented by the weekly Home Media Magazine. Because the website's accuracy is uncertain and I am not able to access the Nielsen VideoScan database to check its figures, I do not consider it to be reliable as a source, even though it provides relevant market share figures, and so I have not used it in my analysis.

8.5. Future Research

This section will outline two future areas of research: a configurational approach to the changing practices of institutional entrepreneurs, and research into the role of social capital in processes of institutional change.

A few theoretical works have been mentioned in this study. The section on critical stakeholders mentioned the new development of institutional complexity (Greenwood, Raynard, Kodeih, Micelotta, & Lounsbury, 2011), in which each stakeholder may represent its own institutional logic. An organization may face multiple coexisting institutional logics (Goodrick & Reay, 2011). In the section on power, the study outlined the developing body of institutional logics. They provide the organizing principles for a field (Friedland & Alford, 1991). It also showed that institutions should not ignore the role of power. A few recent scholars (e.g. Rojas, 2010; Suddaby, 2010) have clearly highlighted the role of power in institutional change. For example, Rojas (2010) argues that social actors may seek power by creating, modifying or supporting institutions.

Based on the findings of this study, I propose some approaches to the study of institutional change. To some extent, these new approaches may be relevant to existing work. Firstly, I intend to determine the configurational practices of institutional entrepreneurs when successfully initiating institutional change. Richardson and Thompson (1999) comment that a strategy's success turns on a combination of external fit and internal fit. 'Internal fit' refers to a development of coherent bundles of changing practices that reinforce one another. An appropriate configuration of institutional change practices must then demonstrate external fit, and thus be matched to the needs of a

particular institutional change strategy. In a sense, sometimes, a single change of practice will result in better performance. However, if such practice conflicts with other practices, less positive or even negative performance may then result.

Hence, this study may require long-term empirical research. Scholars may need to determine the best practices of change in institutional entrepreneurship. In other words, some practices of change may always be better than others and so all institutional entrepreneurs should adopt these practices. For example, Fligstein (1997, 2001) has tried to determine the social skills which institutional entrepreneurs require to initiate a change process. In general, he suggests that the skills of collaborating and using discursive activities are 'must-have practices' for agents of change. Researchers can then combine different practices of change to achieve their strategic goals and defeat their competitors in processes of institutional change.

The second future area of research should be to rethink which theories can be used to explain how organizations defeat competitors in standard wars. This study suggests that social capital could be one such theory. The core proposition of social capital theory is that social ties constitute a valuable resource for conducting social affairs, enabling individuals and social groups to reach outcomes that they could not otherwise achieve or only achieve at extra cost (Coleman, 1988; Burt, 1992; Putnam, 1995). Social capital comprises a set of relationships and shared values created and used by a range of individuals to solve collective problems in the present and future. It helps to explain the mechanisms involved in creating and exploiting collaborative advantage. It comprises both a network and the assets that may be mobilized through that network (Nahapiet & Ghoshal, 1998:243). Connections and access to resources are linked by social capital

theory to information, influence, social credentials, solidarity issues and so on. The discussion of institutional conduits in Chapter 3, shows that using social capital can be seen as a mechanism for controlling collaborations (relational system), which can themselves also be seen as conduits for symbols, routines, and artifacts.

This study indicates that if they possess effective collaborations (mobilizing resources, managing cooperation and coordinations) and an unambiguous voice (developing common vision), institutional entrepreneurs can successfully implement institutional change. These attributes are also outlined by social capital theory. In organizational institutionalism, implementing institutional entrepreneurship can be seen as meaning that focal firms are willing to create and capture values through the activation of their resources. In order to achieve their goals, focal firms are more likely to form alliances with other companies who have similar intentions. These companies may come from different industries. Collaborations may comprise firms with similar goals but divergent opinions and interests. If their actions are compromised, such collaborations may not lead to the level of performance which is expected of them. For this reason, the relational and structural social capital of institutional entrepreneurs can help them to establish relationships with other organizations (i.e. stakeholders), and cooperate and coordinate their interests and actions within collaborations. Moreover, generating an unambiguous voice to the audience requires the construction of shared meanings and understandings by institutional entrepreneurs and their partners. Cognitive social capital can therefore help them to achieve this goal.

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Appendix 1. The Face-to-Face Interview Questions to the Japanese Informant

Q1. What factors did make Sony to decide to sponsor the BD technology?
Q2. Besides the capacity issue, what are the other technological issues considered in the standard war?
Q3. Why did you invite Panasonic to join with you and Philips to sponsor the BD standard together?
Q4. How did you decide to invite Panasonic and Philips together and not invite Toshiba?
Q5. The number of the members is a critical power in this industry? That's why you decided to establish the BDA?
Q6. How did you invite or persuade other companies to join in the BDA.
Q7. Did Sony use your power to influence critical companies to join to the BDA?
Q8. Did Sony play monopoly leadership in the BDA?
Q9. What kind of leadership? A small group leadership?
Q10. The BOD issue should be decided by three-facilitators companies?
Q11. Do you have any internal publications in the BDA to share or exchange information or maintain connections with each other?
Q12. How about this media have any side effect to enhance or maintain the group identity within the BDA?
Q13. What is the advantage to Hollywood studios joining the BDA?
Q14. How did you invite these companies to join with you? use media, promotion committee? or other resources?
Q15. In 2005, Microsoft announced that the Vista would support the HD DVD format. So did these two events have any negative impact on the BD camp?
Q16. Do you have critical events to make Sony or BDA won the format war? Does have any other critical events?
Q17. How about NEC? Did Toshiba not have many other supporters to support the HD DVD?
Q18. If you go back to 2002 or earlier, Sony relaunch the BD format again, What will you do or will not to do?

Appendix 2. The Emails Questions to Media Journalist and Japanese Informant

Q1. In the BD vs. HD DVD standard war, Sony's PlayStation 3 (PS3) played as a trojan horse seeding BD players to market. However, although HD DVD also used Microsoft's Xbox 360 to promote the standard, the Xbox 360's market number was not good as PS3. In your opinion, what advantages and disadvantages did PS3 and Xbox 360 have in the standard war?

Q2. Microsoft announced that he engaged in the HD DVD camp in 2005. At that moment, market and some members in the BD camp believed that the action gave a strong support to the HD DVD standard. However, eventually, Toshiba lost the war. In your opinion, what wrong strategies did Toshiba do with Microsoft in the standard war?

Q3. In the beginning of 2007, *New York Times* reported that HD DVD player is hacked. In your opinion, what influence did it have to Toshiba?

Q4. In your opinion, comparing with DVD Forum, what advantages and disadvantages did the Blu-ray Disc Association have in the standard war?

Q5. Some scholars claim that the skills of collective action and communication are critical capabilities which should be possessed by focal firms when they are implementing standard war. In your opinion, what social skills should be had?

Q6. In your opinion, comparing to JVC VHS vs. Sony Betamax, and Toshiba SD vs. Sony MMCD standard wars, what can we learn from the BD vs. HD DVD standard war?

Q7. In your opinion, what factors caused Toshiba lost the standard war?

Appendix 3. Documenting the Processes of Data Analysis

This chapter documents the process of data synthesis in order to generate the substantive grounded theory that emerged from that data. Its aim is to explain the different stages of data analysis and synthesis which led to the emergence of the sub-core variables. It will also be important to explain how the data was derived from the dataset. This chapter has only one section, which will show how I generated the open codes. Initially, I examined all the media reports to generate the initial open codes. I used a similar process to produce the semi-structured questionnaire for the face-to-face interview with my Japanese interviewee in Tokyo.

A3.1. Generating the Codes

The aim of this section is to show how I coded the data openly in order to derive implications from its. The study borrows grounded theory's principles to analyze its material. I used a conceptual framework developed from the literature to analyze the dataset, which helped me to analyze the data. Much of this data was about purely technical aspects of the standard war and so was not taken into account in the study. Without this irrelevant data, the study produced fewer codes, which were, however, more focused.

The structure of Appendix 3 is as follows: 'names of categories', 'extracts', and 'interpretations'. The structure of section will document the collective action and discursive activities first, because they are the heart of this study. Then, the study will document the rest of variables, power, legitimacy, network effects, and product

performance. Table 6.2 shows that media reports provide many evidences on ‘critical stakeholder management capability’, ‘discursive activities’, and ‘product performance’. The rest of variables are not clearly presented on media reports. Thus, the study collects lots of data from different kind of sources, including WIPO, Datamonitor’s reports, Euromonitor’s statistics, interview transcripts, and Sony, Toshiba, BDA, and DVD Forum’s official websites. However, including the collaboration’s news archives, the market numbers of specific products, such as disc players, game consoles, movie studios’ pre-recorded discs, are not available. I tried to use some complementary data to infer the possible network effects. Unfortunately, the monthly market numbers of a product produced by a particular standard (BD and HD DVD disc players) is still unavailable. Thus, I suggest it as a research limitation and get rid of this theme in this study.

A3.1.1. Codes of Collective Action

‘Collective action’ is defined as a set of communicative practices which take into consideration the engagement of, and interactions between organizations. The aim is to manage a standard and solve its problems through collaboration. Collective action is categorised as part of ‘institutional entrepreneurship in standard wars’. It leads to power and legitimacy for the institutional entrepreneur, and network effects and product performance for the standard. It may also interact with discursive activities. This study will claim that ‘critical stakeholder management capability’ and ‘collaboration structuring capability’ are categories within this supra-code.

A3.1.1.1. Critical Stakeholder Management Capability

The definition of critical stakeholder has been presenting in Chapter 1 (see the sub research question 1). In the optical storage device industry, critical stakeholders mean that they can be complementary product producers, such as movie studios, games software developers and publishers, as well as retailers.

‘Critical stakeholder management capability’ is defined as a process of managing and responding to the expectations and requirements of any critical stakeholder who has an critical resources in a project or will be affected by its deliverables or outputs. The issue of critical stakeholders is implicitly highlighted in studies of previous standard wars, which explicitly define it as being of critical importance. This is because many media reports in the dataset mention the importance of Hollywood studios and retailers. Institutional entrepreneurs can convey the message that their standards are supported by leading companies in the field by using discursive activities. This may in turn motivate other companies to support the standards. Effective critical stakeholder management capability can lead to increased product performance and network effects. If institutional entrepreneurs have effective power and legitimacy at the beginning of a standard war, they will win the engagement of stakeholders. Institutional entrepreneurs therefore need the capability to manage their expectations. If they have this capability, the standard has the possibility of obtaining first-mover advantage.

Some codes exist which force the researcher to examine not only how critical stakeholders can generate network effects, but also how they can help institutional entrepreneurs to persuade other companies in the standard war.

1. Influence of Critical Stakeholders

Extract:

Universal Pictures, Paramount Home Entertainment and Warner Bros. announced they would release movies in HD DVD, the new high definition DVD format developed by Toshiba and NEC. The studios timed the HD DVD announcement to come well in advance of the January Consumer Electronics Show in Las Vegas, where the nation's retailers make buying decisions for the coming year. Hollywood hopes to persuade these buyers -- and hardware manufacturers -- to get behind a single, next-generation DVD format. (Chmielewski, San Jose Mercury, 30 November 2004)

This report shows these studios, from the HD DVD camp, attempting to persuade other companies to join that camp. As the literature review suggests, having market-leading organizations as part of its critical stakeholders might help a focal firm to attract other companies to join that collaboration. This is because they can attract other companies by using their existing networks. It shows that, firstly, the HD DVD standard had the leading position in the market at this point. Secondly, critical stakeholders can use their comments might influence further the perceptions and actions of other companies.

2. First Mover Advantage

Extract:

In addition to the Paramount Home Entertainment unit of Viacom, Universal Pictures, Warner Brothers Studios and New Line Cinema also said they would release titles in the HD DVD format, which its creators promise will offer sharper images and more of the interactive features that have helped make DVD's popular. (Zaun, New York Times, 30 November 2004)

In March 2006, we commercialized the world's first HD DVD player, the "HD-XA1", taking the DVD standard forward to the next generation (Toshiba Annual Report: 23, 2006)

First-mover advantage refers a edge that a company gains by entering a particular market before any competitors. The advantages in capturing critical resources create incentives for investing in technological adjustment. In 2004, at the very beginning of this standard war, the HD DVD standard had more support from film studios because of its cheaper production costs and backward compatibility. In 2006, Toshiba also announced that it launched the first HD DVD player in the world. Based on these statements, I define that Toshiba had first mover advantage in the standard war.

3. Backward Compatibility

Extract:

NEC/Toshiba design will be "backwardly compatible" with today's DVDs. That could be a significant advantage in the marketplace, saving videophiles from having to replace their film collections, or having to use a second player for older discs. (The Economist, 14 December 2002)

‘Backward compatibility’ is defined as the ability of a new storage device to work with input generated by an older device. This compatibility meant that Toshiba had more support from Hollywood studios at the beginning of the standard war, because the compatibility can result in lower production costs to Hollywood studios. Toshiba announced that HD DVD players would be able to read existing DVDs as part of its extension of the DVD standard, an announcement which greatly benefited HD DVD, even though HD DVD did not have the greater capacity of BD.

4. Understanding Expectations

Extract:

Eight of the biggest players in technology, consumer electronics and Hollywood announced a consortium Wednesday to set copy-protection standards for a new generation of high-definition video discs. ... Walt Disney and Warner Bros. studios joined with Microsoft, Intel and IBM, Panasonic, Sony and Toshiba to set standards for all high-definition discs for computers and consumer electronics devices. ... Group members framed the initiative as unlocking new entertainment experiences, rather than setting new consumer curbs. (Chmielewski, Mercury News, 15 July 2004)

‘Understanding expectations’ is defined as the process of recognizing the interests and requirements of critical stakeholders in standard wars. In the beginning of the standard war, some of critical stakeholders established copy-protection standards for hi-def standards. This action tried to make both camps know that the protection mechanism is

their expectation. Institutional entrepreneurs can collect the relevant information on media and/or directly join the group to understand what they want. In a standard war, an effective way of understanding the interests of critical stakeholders is to include them in collaboration.

I also found that the expectations of retailers were represented in the dataset. In a standard war, these retailers can also be seen as a type of stakeholder.

(1) The expectations of retailers

Extract:

For dealers, a format war will mean a whole lot of wasted energy on training staff and educating consumers to understand the distinctions between the two standards, as well as maintaining inventory and providing shelf space for both camps' hardware, blank media and pre-packaged content. (Paone, Dealerscope, February 2005)

In addition to Hollywood studios and consumer electronic manufacturers, the other critical stakeholder in this standard war is the retailer. This is because their channel is the closest to the consumers of the product, and because having two similar standards in the market increases their inventory and other costs.

5. Responding to Requirements

Extract:

*Sony decided to refine the Blu-ray standard in a way that would have far-reaching implications for Microsoft. Sony wanted to win the support of Twentieth Century Fox Film Studios, long Hollywood's leading advocate for tough anti-piracy measures. So Sony agreed to add safeguards developed for Fox by San Francisco's Cryptography Research Inc., which could prevent Blu-ray movies from being ripped to a computer's hard drive. (Edwards & Burrows, *BusinessWeek*, 17 October 2005)*

‘Responding to requirements’ is the process of replying the expectations of critical stakeholders in standard wars. In order to respond to the expectations of a Hollywood studio, 20th Century Fox, the institutional entrepreneur, Sony, developed a copyright protection technology, with Cryptography Research, and added it to the BD standard. In the standard war, both Sony and Toshiba tried to respond stakeholders’ expectations. This study defines responding to requirements as the process in which the focal firm takes actions to respond to the expectations of critical stakeholders.

6. Seeking Exclusive Support

Extracts:

*The studios [Paramount and Dreadworks] won undisclosed financial incentives for exclusive commitments to release high-definition movies onto HD DVD only. (McBride, *Wall Street Journal*, 21 August 2007)*

Seeking exclusive support is seen as the process in which the exclusive support of stakeholders is sought in standard wars. In this standard war, the most important factor was the size of the share of the DVD market, because, it determined whether the standard would gain a large enough number of complementary products to generate network effects. Thus, Toshiba used financial incentives to persuade these studios to exclusively support the HD DVD standard.

This code has a sub-code.

(1) Winning the support of Hollywood

Extract:

*The HD DVD group, he [Toshiba spokesman, Keisuke Oomori] said, has made "substantial progress standardizing our formats" and is "gaining positive understanding for our format from the Hollywood studios." (Belson & Sorkin, *The New York Times*, 15 September 2004)*

*Toshiba's HD DVDs are very similar to existing DVDs, and could use much of the same equipment to make them. That means it's quicker and cheaper, for now, to make HD DVDs than Blu-Ray discs. "It's all a matter of [disc-making] infrastructure," says Kanji Katsuura, chief technical officer at Memory-Tech Corp., a Japanese disc maker that's supporting the Toshiba-led effort. "If the infrastructure is in place, Hollywood won't be able to ignore it." (McBride & Dvorak, *Wall Street Journal*, 29 November 2004)*

The HD DVD camp's actions reflected the fact that Hollywood was one of the critical stakeholders in this standard war. This study defines this action as one which aimed to win the support of the stakeholder. Generally speaking, in order to win this support, institutional entrepreneurs need to communicate their interim performance and proposal to stakeholders.

7. Giving Incentives

This is defined as the process in which tangible or intangible resources are used to attract the engagement of critical stakeholders.

Extracts:

...after offering huge financial incentives like marketing support and cash payments, the HD DVD camp got Paramount and DreamWorks Animation SKG to agree to publish high-definition versions of their titles on HD DVD only. (McBride, Wall Street Journal, 25 September, 2007)

It may have been that no money changed hands. But Sony, from what I recall, gave member companies a percentage of future royalties, which was worth quite a lot. So perhaps they weren't induced to join by money upfront, but by a share of future sales.

(Interview with journalist)

Both Toshiba or Sony gave resources to critical stakeholders which motivated them to support their standard.

I found that the engagement of Microsoft in the HD DVD camp highlighted the importance of critical stakeholder management capability. The BDA also used it to further influence the Hollywood studios' understanding of the standard war. I have derived several codes from the engagement of Microsoft.

A3.1.1.2. The Codes of Additional Findings Concerning Critical Stakeholder Management Capability

1. The Impact of Microsoft

Extract:

*Microsoft and Toshiba yesterday said they would jointly investigate the development of High Definition-DVD (HD-DVD) players, in a move that considerably strengthens the Japanese consumer electronic group's position in the ongoing format wars over next-generation DVDs. Backing from Microsoft will provide Toshiba with additional leverage in its battle against Sony over a single, unified format for next-generation DVDs. (Sanchanta, *Financial Times*, 28 June 2005)*

*Maureen Weber, general manager of personal storage in H-P's personal-systems group, said H-P was "shocked" when Microsoft and Intel announced support for HD-DVD. Ms. Weber said H-P offered the compromise at a Blu-ray trade-group meeting yesterday in Los Angeles. "We're trying to broker a settlement here," she said. (Wingfield, *The Wall Street Journal*, 20 October 2005)*

The engagement of Microsoft can be seen as a turning point in this standard war. Many companies believed that Microsoft were giving strong support to the HD DVD camp, because its operating system dominated the PC industry. This code indirectly enabled me to produce codes in later sections relating to conflicts of interest in collaborations, and collaboration turbulence.

2. Contradicting the Expectations of Critical Stakeholders

Extract:

Microsoft and Intel say that Toshiba has proven that its discs can be copied onto hard drives and home servers and sent over home networks. (Belson, New York Times, 27 September 2005)

... piracy is cutting into sales far more than predicted, the studios also reason that they should move more quickly toward the new technology because of its superior antipiracy features. (McBride & Dvorak, Wall Street Journal, 29 November 2004)

This report demonstrates that, after the engagement of Microsoft, open copyright protection contradicted the expectations of movie studios. Sony's actions concerning copyright protection (BD+) (see the 'Responding to Requirements' code) further influenced the film studios' faith in the BD standard. The institutional entrepreneur can also use the media to communicate its activities to its target companies, and to many others. This may directly or indirectly influence their perceptions, interpretations and actions.

A3.1.1.3. Collaboration Structuring Capability

‘Collaboration structuring capability’ can be defined as a process of establishing formal structures and rules, in order to manage effective collaborations in which divergent members exchange and share opinions and resources in order to achieve common goals. Unlike critical stakeholder management capability, this capability is focused on determining the best ways of managing the actions of members (including critical stakeholders) in order to achieve goal. The data in this section is mostly taken from the official documents of the collaboration (BDA), and from the public archive. This is partly because public access to the DVD Forum is not permitted.

In a similar way to critical stakeholder management capability, collaboration structuring capability not only leads to network effects and product performance, but also interacts with discursive activities. This capability is also able to strengthen the power and legitimacy of an institutional entrepreneur throughout a standard war.

As a result not only of the literature but also of the code, I initially focused on the relevant actions and strategies of the collaborations.

1. Establishing Collaborations

It can be defined as to arrange a system of act of working with another or others on a joint project.

Extracts:

Two industry groups are promoting incompatible formats: Blu-ray Disc Founders, a consortium of Japanese companies led by Sony and recently joined by Hewlett-Packard Co. and Dell Inc.; and the DVD Forum, led by Toshiba Corp. and NEC Corp. (Anthes, Computerworld, 26 April 2004)

...Prior to the show [Combined Exhibition of Advanced Technologies, CEATEC], members backing the Blu-ray disc announced the formation of the Blu-ray Disc Association (BDA). (Dritsas, Dealerscope, November 2004)

Before the BD-HD DVD standard war, Toshiba was part of the DVD Forum. Sony and many other BD founders were also members. In addition, Sony established BDF and BDA later in the standard war. I found much more information about this on the BDA's official website, and then responded to the literature on the importance of collaboration.

2. The Portfolio of Institutional Entrepreneur

This is defined as the set of direct ties possessed by an institutional entrepreneur in a standard war. This code initially consisted of two sub-codes.

(1) Co-founders

Co-founders refers to the group of companies which jointly develop a technological standard.

Extract:

NEC Corp. and Toshiba Corp. last week announced a blue laser format for next-generation DVDs that differs from the version proposed earlier this year by another group consisting of Matsushita Electric Industrial Co. Ltd., Philips Electronics, and Sony Corp. (Robertson, EBN, 2 September, 2002)

The HD DVD standard was co-developed by Toshiba and NEC. The issue of co-founders shows that when establishing a process of technological standard change, companies need to collaborate.

(2) Increase in Leading Members

Extract:

[Blu-ray Disc] It has already garnered the support of many of the largest consumer electronics companies in the industry, including Dell, Hitachi, HP, JVC, EG, Panasonic, Philips, Pioneer, Samsung, Sharp, Sony and Thomson, as well as most major blank media vendors. (Dritsas, Dealerscope, November 2004)

For two years now, rival camps have been battling over which new DVD format will prevail: Blu-ray, which is backed by Sony and a consortium of 170 other companies, (Grover & Edwards, BusinessWeek, 17 December 2007)

This refers to the fact that the engagements of critical stakeholders and/or other companies in the relevant industries increase through collaborations. As more and more leading companies joined the BD collaboration, the legitimacy of that standard could be

massively increased. The action of announcing that these leading companies had joined the collaboration can also itself be viewed as a discursive activity. Moreover, as so many news releases had already reported that the BD standard had greater capacity, as well as other relevant issues, this announcement also reflected the fact that previous discursive activities had influenced the perceptions of some companies, and then caused them to take action.

3. The Structure of Membership

This is an result of the process of professionalisation, and a set of rules which explicitly defines the responsibilities and obligations of all members of a collaboration. The code is from BDA's by-law (v.1.9). Based on the limited information about HD DVD, I only can access the membership structure of DVD Forum from its website.

Extract:

Membership in the BDA is open to any entity that demonstrates interest and engages in developing, improving or otherwise supporting the Blu-ray Disc Formats in accordance with the objectives. (BDA by-law v.1.9)

Board of Directors: Companies participating in the Board of Directors are active participants of the format creation and key BDA activities. They are selected from the Contributors by election. The board sets an overall strategy and approves key issues. ...

Contributor: Contributors are active participants of the format creation and other key BDA activities. They can be elected to become a member of the Board of Directors. ...

General member: General membership provides access to specific information from

Committee discussions. A general member can attend general meetings and seminars. They can participate in specific Regional Promotion Team activities and specific CC activities. (BDA Global site: <http://blu-raydisc.com/en/association/association/MembershipLevels.aspx>)

“Facilitator” means the Director designated by the BOD to facilitate the BOD meetings as a BOD Chair or co-Chair and fulfill the Facilitator duties... (BDA by-law v.1.9)

The BDA has two classes of membership, contributor and general member. They are managed by the Board of Directors. In addition to these different classes of membership, members may have different responsibilities and obligations. My Japanese interviewee told me that the entire BDA is actually managed by three facilitators³¹, and is therefore able to generate ‘one voice’.

4. R&D Activities

The term ‘R&D activities’ refers to a “systematic investigation or experimentation involving innovation or technical risk, the outcome of which is new knowledge, with or without a specific practical application of new or improved products, processes, materials, devices or services” (Rogers, 1998: 12). This code uses the BDA’s by-law (JTC and CC) and DVD Forum’s TVG.

Extract:

³¹ According to BDA by-law v.1.9, facilitator means the Director designated by the BOD to facilitate the BOD meetings as a BOD Chair or co-Chair and fulfill the facilitator duties in BOD and BDA’s general meetings.

The BDA has a Joint Technical Committee (JTC) and Compliance Committee (CC) to create, uphold and test new innovations to the BD standard. (BDA by-law v.1.9)

According to this BDA by-law, the JTC coordinates and accelerates technical discussions in or among Technical Expert Groups, as well as submitting technical proposals to the BOD for approval. It also presents the technical viewpoint of the BDA, using strategic guidelines determined by the Promotional Committee. In order to guarantee consistent end-user experience, the Compliance Committee also ensures the compatibility and interchangeability of all BD products. It supports rapid and broad acceptance of the BD standards in relevant industries. The definitions of sub-groups in DVD Forum are not available.

5. Frequent Communication

Frequent communication is defined as the ways in which institutional entrepreneurs have formal communications, involving exchanging and sharing opinions and approving decisions, with other members of collaborations. Due to data limitation the term ‘frequent communication’ is used only to describe formal communication.

Extract:

A general meeting shall be held once a year upon the call of the BOD. Such meeting shall be notified by the secretary in writing to all members at least thirty (30) days prior to the scheduled meeting date. At each general meeting, the BOD shall report a

summary of the activities of the BDA during the past year (including adoption of Blu-ray Disc Formats), as well as the plan for the next year's activities. (BDA by-law v.1.9)

In addition to this, according to BDA by-law v. 1.9, each committee also has its own meeting. The aim of the general meeting is not only to exchange and share opinions and to appoint the official positions, but also to maintain relationships between members.

The relevant information in DVD Forum is not available.

6. Organizing Promotion

This study defines 'organizing promotion' as the use by institutional entrepreneurs of collaborations to define campaigns and utilize strategies, in order to promote and target standard and relevant technologies to relevant audiences. The media frequently reported promotional messages from both camps, so this section chooses only a few extracts.

Extract:

The promotion committee formulates a strategic approach to promote BD formats in various product categories. It creates and participates in events and activities that: promote BD formats, showcase BD products, educate and train key audiences on BD formats and technology, promote compatibility of BD products and create a community for General Members of the BDA. (The BDA Structure, <http://www.blu-raydisc.com/en/association/structure.aspx>)

According to the BDA by-laws v. 1.9, promotion means that institutional entrepreneurs define and approve promoting and marketing campaigns in collaborations, and then the members of those collaborations create their own relevant campaigns. Without an united plan, institutional entrepreneurs are unable to produce the required ‘unambiguous voice’ for their audiences. This may create suspicion and lead to misunderstandings within the market. Moreover, it may also negatively influence the network effects and product performance of a standard, or even the resources of institutional entrepreneurs themselves.

7. Enhancing the pool of movies

Extract:

*With the exception of Sony's movie division, which includes the Columbia and TriStar studios, that naturally backs the Blu-ray format, the movie studios have so far avoided backing one standard despite intense lobbying by both the Blu-ray and HD DVD groups. By buying MGM, Sony will be adding another studio to the list of Blu-ray backers, and a catalog of 4,000 movies that could be issued exclusively in the Blu-ray format. (Belson & Sorkin, *New York Times*, 15 September 2004)*

Buying MGM might not have seemed an obvious strategy for winning this standard war. However, if these studios were owned by a focal firm, it was not surprising that they would at least inclusively support that firm’s standard.

A3.1.1.4. The Codes of Additional Findings Concerning Collaboration Structuring Capability

1. Collaboration Turbulence

The term ‘collaboration turbulence’ refers to a collaboration characterised by chaotic jolts or attacks from competitors.

Extract:

H-P was "shocked" when Microsoft and Intel announced support for HD-DVD. Ms. Weber said H-P offered the compromise at a Blu-ray trade-group meeting yesterday in Los Angeles. (Wingfield, Wall Street Journal, 20 October 2005)

If Hewlett leaves the Blu-ray group, it could put pressure on Dell, another Blu-ray member, to follow. This would provide a huge lift to Toshiba, which has recently lost ground to the Blu-ray group in the battle for allies in Hollywood and Silicon Valley. (Belson, New York Times, 17 November 2005)

Microsoft’s support of the HD DVD standard caused a severe shock for HP, one of the members of the BDA’s BOD. HP’s actions demonstrates that institutional entrepreneurs can attack the collaborations of its competitors.

2. Conflicts of Interest in Collaborations

Extract:

*While still supporting the Blu-ray format, Hewlett took the unusual step of announcing its request as the board members of the Blu-ray group met in Los Angeles. The move signaled a potential rift in the Blu-ray camp between consumer electronics giants like Sony, Panasonic and Samsung, and computer makers like Hewlett and Dell. In a pointed ultimatum, Hewlett said that if the additional technology was not added to the Blu-ray format, it would consider switching allegiances and backing the rival standard, Toshiba's HD-DVD. (Belson, *New York Times*, 20 October 2005)*

Microsoft's engagement in Toshiba camp did give the pressure on HP. HP's actions signal that there is a conflict interest between consumer electronic companies and PC companies.

A3.1.2. Codes of Discursive Activity

The term 'discursive activity' can be defined as the actor display[ing] or tr[ying] to draw other people's attention to the meaning of an object or action that goes beyond the object or action's intrinsic content or functional use (Zott & Huy, 2007: 70). The critical stakeholder management and collaboration structuring capabilities of institutional entrepreneurs can be promoted through discursive activities. In turn, by using discursive activities, institutional entrepreneurs can motivate stakeholders to join collaborations and so further strengthen product performance and network effects. Discursive activities also have interaction effects with the power and legitimacy of institutional entrepreneurs.

Sony and Toshiba both mostly used discursive activities to communicate and construct meanings not only about the outcomes of collective actions, but also about capacity, production costs and copyright protection issues throughout the standard war. These three issues also reinforced their product performance.

1. Framing

The term ‘framing’ can be defined as the use of various verbal and non-verbal discourses to construct the identification and expression of a novel understanding of a problem, and to explicitly provide compelling reasons to support the new vision being promoted.

Extract:

... senior vice president of the Blu-ray Disc Group at Sony Corporation of America, says the next format may be the last packaged media. "Having Panasonic, Pioneer, Sony, and Philips involved is a pretty strong representation of core technologies for optical disc. The key issue is to make sure that we could maximize the capacity on the disc. (Block, Emedia, March 2004)

A key advantage for HD DVD and a big selling point to manufacturers is the fact that the technology allows disc manufacturers to use their existing DVD plants and equipment to produce HD DVD discs. (Paone, Dealerscope, January 2004)

Media reports mainly stated that both standards could provide greater capacity than the DVD standard. In later media reports, and in their other supplementary documents,

Toshiba independently framed the HD DVD standard's advantages as being lower production costs and the BD standard's is being greater storage capacity.

There are three sub-codes here.

(1) Highlighting the Issue of Capacity

Capacity is the ability of the disc to store content.

Extracts:

The Sony-Matsushita-Philips camp last February unveiled its new DVD concept, called Blu-Ray. It uses a 0.1mm disk substrate layer that allows up to 23Gbytes of storage on one side of a DVD. (Robertson, EBN, 2 September 2002)

A thinner substrate means the laser can get even closer to the data. The closer the laser, the smaller the focus spot. As a result, a dual-layer Blu-ray disc has room for 50GB of data (25 GB on each layer), while the HD-DVD format can only hold 30 GB (15 GB on each layer). (Kerschbaumer, Broadcasting & Cable, 25 October 2004)

This greater capacity can be seen as the competitive advantage of the BD standard. In the previous standard war, between VHS and Betamax, Sony had learnt that capacity could be a critical feature of a storage device. At the very beginning of this standard war, both Sony and Toshiba defined their advantages, and the BD standard was shown to be better than the HD DVD standard in this particular issue.

(2) Highlighting the Issue of Production Costs

The term 'production costs' refers to the sum of all the costs associated with the manufacturing of a specific product.

Extract:

That requires new tooling and equipment, raising production costs. The NEC-Toshiba blue laser has the same 0.6mm disk layer used in the current DVD red laser standard. The two companies [Toshiba and NEC] claim that DVD makers could switch production much easier and come to market much sooner. (Robertson, EBN, 2 September 2002)

Although Sony and Toshiba both possessed blue laser technology, they had different strategies in this standard war. Sony defined the BD standard as a brand new technology, while Toshiba defined the HD DVD standard as an extension of the DVD standard. In this vein, Toshiba defined that lower production costs is the main advantages of HD DVD standard in the standard war.

(3) Highlighting the Issue of Copyright Protection

Extract:

The studios also have a huge stake in the change to the new technology because they now make more money from DVD sales than from box office sales. They also lose

millions of dollars a year from pirated DVD's. (Belson & Sorkin, New York Times, 15 September 2004)

Both formats provide ... advanced copy protection, making it harder for pirates to copy movies. (McBride, Wall Street Journal, 9 December 2004)

Copyright protection prevents digital content from being copied, and so copyright protection mechanisms are one of the issues which concern Hollywood studios. When Hollywood described this issue as being a critical one, it could be seen as the main stake of these content providers in the digital era.

In addition to these three codes, this study will present in the following sections the additional codes which relate to discursive activity.

2. Promoting

Extract:

A key advantage for HD DVD and a big selling point to manufacturers is the fact that the technology allows disc manufacturers to use their existing DVD plants and equipment to produce HD DVD discs. Recently in New York, Toshiba and NEC presented two companies, disc replicators Ginram and Memory-Tech, that are doing just that. That could mean cheaper discs down the road than Blu-ray. (Paone, Dealerscope, January 2004)

One of the biggest advantages of BD, according to Sony, is its robust copy protection. "The physics of information retrieval at Blu-ray densities mandates changes to the disc

form factor and to playback hardware architecture," says Mitchell. "These facts create a unique opportunity in that content protection can be based on interactions between three elements: software, hardware, and the physical disc. (Block, Emedia, March 2004)

This study defines 'promoting' as giving publicity to a standard, collaboration and/or in order to increase its sales, adoption and awareness among the public. In the standard war under discussion, both parties used media discourses, conferences, technological exhibitions and other products to seed their standards into customer's homes. In order to ensure that the new standard is rapidly adopted by its audiences, institutional entrepreneurs need to use promoting strategies to increase the likelihood of its adoption.

3. Undermining

An 'undermining strategy' can be defined as the active use of discourses to implicitly or explicitly erode or impede the base of a rival's standard or collaboration.

Extract:

Fidler [senior vice president of the Blu-ray Disc Group at Sony Corporation of America] said that the proposed HD-DVD format lacks "wow factors," while BD-ROM boasts a new copy protection scheme currently in development by Matsushita, Philips, and Sony; a Java programming environment; better navigation and graphics capabilities; Internet connectivity integrated into a BD-ROM player for downloading

additional materials, including subtitles for foreign language content; and plenty of room for data storage. (Yoshida & Hara, EBN, 17 November 2003)

Institutional entrepreneurs are generally less likely to explicitly use undermining strategies. The “wow factor” was proposed by one of the Sony top manager, Mike Fidler. By using undermining strategy, institutional entrepreneurs aim at promoting their advantages of own standards. In this standard war, the institutional entrepreneurs acted the undermining strategy with restraint. Undermining actions are normally accompanied by promotional activities. Nevertheless, I found one explicit undermining action in the dataset, which I coded as a stakeholder rebellion.

(1) The Stakeholder Rebellion

Extract:

Last month, after offering huge financial incentives like marketing support and cash payments, the HD DVD camp got Paramount and DreamWorks Animation SKG to agree to publish high-definition versions of their titles on HD DVD only. (McBride, Wall Street Journal, 25 September 2007)

The studios won undisclosed financial incentives for exclusive commitments to release high-definition movies onto HD DVD only. (McBride, Wall Street Journal, 21 August 2007)

The term ‘stakeholder rebellion’ refers to the departure of a particular stakeholder from a collaboration in order to join a competing collaboration. The relevant information

shows that Toshiba used financial incentives to invite these studios to give their exclusive support to the HD DVD standard. Consequently, both studios said that they would give exclusive commitment from BD standard to HD DVD standard. Could we say, because of this, that giving financial incentives could be seen as a kind of stakeholder management? The answer is 'yes', and the giving of these financial incentives has been so coded in a previous section. This code is the outcome of giving incentives to critical stakeholders.

4. Debating

'Debating' can be defined as the ways in which institutional entrepreneurs deliberately defend and explain their actions and behaviors when these are challenged by their competitors in the media.

Extract:

[After Paramount, Universal, and Warner Bros. announced that they would support the HD DVD standard in 2004. At the moment, Disney chose the BD standard] Bob Chapek, president of Disney's Buena Vista Home Entertainment [one of the BDA's BOD], said the studio's decision was based on its belief that Blu-ray will provide a superior experience for consumers. He thinks the interactivity, in particular, is better on Blu-ray, allowing commentary or game-playing overlaid onto the movie. (McBride, Wall Street Journal, 9 December 2004)

It's all a matter of [disc-making] infrastructure," says Kanji Katsuura, chief technical officer at Memory-Tech Corp. [became Toshiba's partner in the early 2004], a Japanese

disc maker that's supporting the Toshiba-led effort. "If the infrastructure is in place, Hollywood won't be able to ignore it." (McBride & Dvorak, Wall Street Journal, 29 November 2004)

Using a debating strategy, institutional entrepreneurs can defend their existing announcements, actions and policies. The strategy can also be accompanied by promotional strategies. Using stakeholders to debate the actions of institutional entrepreneurs can further strengthen their legitimacy and power. If it ignores the importance of debating in a standard war, an institutional entrepreneur may suffer considerable losses.

5. Spokespersons

The study defines spokespersons as individuals who are responsible for representing a company in the media. This code was first highlighted by the BDA by-laws and media reports. I then researched the topic in more depth.

Extract:

Anyway, yes, we have what we call a promotional committee, and the chair of the committee is the general spokesperson for the BDA. Mr Mazuda from Panasonic is currently the chair of the global promotional committee. (Interview in Japan)

According to this, every public announcement by the BDA must be approved by the BOD. By doing this, the BDA was able to generate an unambiguous voice in the

standard war. I also examined other spokespersons in this standard war, and it was clear that BDA's spokespersons were more active than those of Toshiba or the DVD Forum.

A3.1.2.1. The Codes of Additional Findings Concerning Discursive Activity

1. Technological Exhibitions

Extract:

When it comes to high-definition DVD recording, CEATEC [Combined Exhibition of Advanced Technologies] proved that the Blu-ray format is making serious advances toward the future. Prior to the show, members backing the Blu-ray disc announced the formation of the Blu-ray Disc Association (BDA) and welcomed its first member from the content industry, 20th Century Fox. (Dritsas, Dealerscope, November 2004)

The article strongly suggests that technological exhibitions, such as CEATEC, CES (the Consumer Electronics Show), and so forth, played a critical role in this standard war. In technological exhibitions, institutional entrepreneurs are able to announce critical information to different media at a single time and place, and can also use a variety of different discursive strategies, sometimes in combination with each other. In the dataset, many discursive strategies are shown in the media reports of exhibitions.

2. Hacking

Extract:

*The new intrusions came less than a month after a programmer calling himself Muslix64 announced in a Web forum that he had unraveled at least part of the HD DVD protection system. Muslix64 released free software that allows users to insert HD DVDs into their computers and make copies of those films without the original encryption. (Stone, *New York Times*, 17 January 2007)*

In the beginning of 2007, *New York Times* reported that the HD DVD player was hacked by Muslix64. The dataset does not contain any media reports giving Toshiba's response to this instance of hacking. The lack of action from Toshiba and the HD DVD camp, in response to the hacking, shows that when, institutional entrepreneurs do not give proper feedback or debate to negative information, they may suffer negative outcomes in standard wars.

A3.1.3. Codes of Power

In this study, power has been discussed in chapter 4 and 5. This study uses soft power (Nye, 2004), derived from illusion, the exploitation of the tendencies of others, and time (Santos & Eisenhardt, 2009), for presenting the role of power in the standard war. Presenting their experience on the previous standard wars, showing their relationships with leading companies in markets and their understanding about the expectations of critical stakeholders and other member organizations, institutional entrepreneurs can brainwash other organizations that they have understand the audience's expectation toward the new standards. In this vein, institutional entrepreneurs keep a space of illusion for their audience that their new standards will be successful. Hence, having the

power, institutional entrepreneurs can further motivate other actors to engage in projects of change. This study produces two codes (networking and experience of previous standard wars) to analyze the power.

A3.1.3.1. Networking

Three codes are included in the category: ‘networking with critical stakeholders’, ‘core employees’ networking’, and ‘continuous collaborative patent applications’

1. Networking with Critical Stakeholders

This is defined as the degree of direct links, frequent communications, collaborative R&D activities, and intimate contact which an institutional entrepreneur has with its critical stakeholders.

Extracts:

With all 10 of Blu-ray’s founding members retaining their seats on the DVD Forum’s 17-member steering committee... (Yoshida & Hara, EBN, 17 November 2003)

...many companies such as Philips, Toshiba and Panasonic, among others. We were talking to each other, or engineer were talking to other engineers... And, you know, we had the DVD Forum for the BD issue,. Then, yes of course, we also discussed things within the DVD Forum. (Interview in Japan)

Some media reports state that Sony, alongside other BD founder-members, held positions on the Steering Committee of the DVD Forum (Yoshida & Hara, 2003). Especially, DVD Forum also gives an opportunities for Sony, Toshiba, and other companies for discussing the development of next-generation optical storage standards. This networking was a reason why Sony chose particular companies to establish the Blu-ray Disc Founders and these companies also hold the position in the DVD Forum.

2. Core Employees' Networking

This refers to the ways in which core employees working in focal firms can convey information and influence employees of other companies through personal connections.

Extract:

...there are some really distinguished engineers in Sony, Panasonic and Philips. And these three engineers led discussions with these other companies... Actually, these three engineers were really respected by engineers in other companies. They are really what we call innovative engineers, and are very famous in the industry. Engineers in other companies were taught by these three men. (Interview in Japan)

Due to the contacts and credibilities that came from these engineers, the BD standard could rapidly establish its specifications and obtain support from other companies.

3. Continuous Collaborative Patent Applications

This refers to continuous applications for rights to an invention regarding to the new standard during the standard war. The applications may be individually developed by institutional entrepreneurs or collaboratively developed by institutional entrepreneurs, critical stakeholders and/or the organizations engage in the rival camp.

Extract:

[The data is collected from WIPO database]

This code responds the guidelines of power in chapter 5. To sum up, Sony and Toshiba applied for a considerable number of optical patents individually and collaboratively (with critical stakeholders and prospective organizations) between 2002 and 2008. It can be interpreted as showing that they apply regularly for optical patents every year.

A3.1.3.2. Experience of Previous Standard Wars

‘Experience of previous standard wars’ can be defined as practical knowledge and skills which are derived from participation in the events and activities of previous standard wars, and are relevant to the current standard war. The idea is derived from media reports and interviews.

1. The Previous Standard War between VHS and Betamax

Extract:

Sony "can pose a more credible threat to launch on their own," ... "On the other hand, Sony of all companies has been badly burned by having new technologies launched in two formats." Sony was the big loser in the battle over the video cassette format, with VHS becoming the dominant format over Sony's Betamax. (Belson & Sorkin, New York Times, 15 September 2004)

This is not the first media report to state that the standard war between BD and HD DVD was similar to that between VHS and Betamax. This media report presents that Sony has experience in launching new technologies in standard wars. In a sense, Sony know how to launch a standard war.

2. The standard war between SD and MMCD

Extract:

Sony and Philips insisted that the MMCD was the best solution ... Disc safe, I'm not a engineer, so I cannot tell it clearly. But the disc safe is basic. For example, the DVD and BD technology. BD is safer. We have protection technology. (Interview in Japan)

My Japanese interviewee confirmed an important point about the previous standard which was not highlighted by the media. That is, Sony mainly believed that their copyright protection mechanism was better than that of the Toshiba SD in this standard

war. For this reason, Sony kept promoting the advantages of their copyright protection in the standard war between BD and HD DVD.

To summarize, if institutional entrepreneurs have relationships with stakeholders and use the connections of core employees, institutional entrepreneurs can rapidly establish collaborations and establish the specifications of their standards. In turn, in a standard war, power can lead to collective action.

A3.1.4. Codes of Legitimacy

An institutional entrepreneur achieves legitimacy when its actions and strategies are seen as being proper, desirable or appropriate within the socially constructed systems of particular fields. Legitimacy interacts with both collective action and discursive activity. If an institutional entrepreneur possesses well-known business segments, other companies will be more likely to believe in the potential of its standards and performance. Similarly, if it has a large number of consumer electronic products related to its new standard, it makes other companies believe that this new standard can be achieved.

The next four codes are not represented in media reports. This is because the literature showed me that I should look at the role of legitimacy in this standard war. As a result, after reading through many supplementary data, including the annual reports and database of the focal firm, I developed these four open codes.

A3.1.4.1. The Main Business Segment of Critical Stakeholders

Extract:

[The extracts in 7.1.4.1 refers Datamonitor's Company Profile reports of both camps' critical stakeholders. The relevant information can be referred Table 8.9]

The main business segment is a component of an enterprise that provides a single service or product or a group of related products. Media reports show that Sony and Toshiba are both world leaders in electronics. In addition to those for Sony and Toshiba, I reviewed the Datamonitor database reports about business segments of many other critical players in this standard war. According to Koch (2011), the strategies of firms are influenced by their histories. For this reason, their main business segments lead to the development of their standards, and the discursive activities they engage in during a standard war. Moreover, if they have other high performing products related to the new standard, their projects of change will be seen as credible.

A3.1.4.2. The Performance of Star Products

Extract:

[The relevant information refers to Sony and Toshiba's Company Profile reports in Datamonitor. I also collect their annual reports from 2002 to 2008 to reviewing their star product performance in the past.]

In the dataset, few media reports mention the star products of Sony and Toshiba in detail. For this reason, I collected data from the Datamonitor database and from the official websites and annual reports of the companies.

1. Sony's history

Because of their histories, Sony and Toshiba display outstanding performance in specific products. In general, the specialist area of Sony is consumer electronic products while that of Toshiba is the manufacturing of electronic equipments.

Extract:

[Sony's history refers to its official website (<http://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/index.html>), its annual reports from 2002 to 2008, and Company Profile reports in Datamonitor.]

In general, how Sony has grown around its audio and video business. It is also capable of seeking opportunities in new businesses such as music, film, and games, and, as a result, had developed many outstanding consumer electronics before the launch of the BD standard.

2. Toshiba's history

Extract:

[Toshiba's history refers to its official website (<http://www.toshiba.co.jp/worldwide/about/history.html>), its annual reports from 2002 to 2008, and Company Profile reports in Datamonitor.]

Generally speaking, consumer electronic products is not Toshiba's main business segment. Between 2002 and 2008, Toshiba focused solely on the manufacturing of electronics equipment, although it won the last standard war (SD vs. MMCD) with Sony. More directly relevant to the HD DVD standard were its acquisition of Amuse Pictures in 2003, and its signing of an agreement to develop consumer electronics devices and PCs in collaboration with Microsoft Corporation.

A3.1.5. Codes of Product Performance

This is defined as ways in which the technical quality and price of products are developed by institutional entrepreneurs and have to satisfy stakeholders and customers. Effective collective action and discursive activities lead to strong product performance in a standard war. Capacity, copyright protection, backward compatibility, video and audio quality, and production costs are coded in previous sections. I also found that Sony and Toshiba adopted different pricing strategies for games consoles and disc players.

1. Pricing Strategy for Disc Players

Extract:

...["If people don't know why it's important to them, why should they care what the price is?" "This is why we have a natural curve with an early-adopter group of people who are very focused on technology and performance," he [Andy Parsons, the BDA's spokesman] explains. ... "This is why our player is \$1,800 [BDP-HD1]. We focused on getting 1080P, because that is something we knew would resonate with the initial target market ... (Mutschler, *Electronic Business*, May 2006)

Toshiba will sell two players starting in March; one will cost just \$499 [HD-A1], half the price of the cheapest Blu-ray machines [Samsung BD-P1000], the first of which will hit the stores this spring. (Belson & Fackler, *New York Times*, 26 February 2006)

Toshiba used lower pricing (\$499) to promote HD DVD players, while the first BD player, developed by Pioneer (the BDP-HD1), was priced at \$1,800, and even Samsung's first BD player cost \$1,000 (BD-P1000). The BDA claimed that the BD camp would inform consumers of the true nature of high-definition. However, Toshiba's lower price meant that HD DVD players had the leading market position when the two camps unveiled their disc players in 2006.

2. Pricing Strategy of Game Consoles

The pricing data for game consoles (the Microsoft Xbox 360 and Sony PS3) is mainly from the reports of Datamonitor. The report *Business Insight – The Future Digital Home* showed that the final price of the Microsoft Xbox 360, in which the HD DVD device was integrated, was higher than that of the all-in-one Sony PS3. Moreover, the *Wall Street Journal* confirmed that the PS3 successfully seeded BD players into consumers' living rooms.

Extract:

The new Sony player, dubbed the BDP-S300, will cost \$599, but will have the same features and performance as Sony's current Blu-ray player, the BDP-S1 which costs \$999. It will compete more directly with HD-DVD players costing about \$499. Until now, the cheapest way for most consumers to obtain a Blu-ray player has been to purchase a \$499 PlayStation 3 video game console... (Taylor, FT.com, 26 February 2007)

BD disc players have more expensive price than HD DVD disc players. However, Sony's PS3 just \$499. Thus, Sony used cheaper product price on PS3 attracting consumers to purchase game consoles rather than purchasing disc players. In this vein, the consumers can experience more entertainment from the BD standard, such as movie, game softwares, and so forth. This study therefore indicates that the BD standard had a better product performance (product price) than the HD DVD standard in this standard war.

Apart from the price of disc player and game console, audio and video quality of both standards are rarely mentioned in the relevant media reports. The issues of capacity and copyright protection mechanism, the BD standard is better than the HD DVD standard. However, the HD DVD standard is better than the BD standard on the compatibility issue.

3. Product Performance on Audio

Extract:

[The relevant information of audio quality, Sony BDF-S1 refers to it's official website (<http://store.sony.com/p/BDP-S1/en/p/BDPS1#features>). Toshiba has removed the information from global website. The information refers to Toshiba Canada (<http://www.toshiba.ca/web/product.grp?lg=en§ion=2&group=521&product=5950&category=#details>).]

In general, both disc players provided similar performance on audio. Sony's adopted Dolby Digital³², Dolby Digital plus³³ Decoding, Dolby TrueHD³⁴ Decoding, LPCM³⁵, MP3 Playback, DTS³⁶ Decoding, HDMI³⁷ and dts Output. Toshiba's adopted Dolby Digital, Dolby Digital Plus Decoder, dts, dts-HD³⁸ Decoder, Dolby True HD Compatible, MP3 Playback, and HDMITM³⁹ audio support. Both BD and HD DVD standards video specifications have HDMI.

³² Dolby Digital is the name for audio compression technologies developed by Dolby Laboratories.

³³ Dolby Digital Plus is an enhanced coding system based on the AC-3 codec. AC-3 means audio codec 3. A codec is a device or computer program capable of encoding or decoding a digital data stream or signal

³⁴ Dolby TrueHD is an advanced lossless audio codec technology.

³⁵ LPCM (Linear pulse-code modulation) is a method of encoding audio information digitally. It is used for the lossless encoding of audio data.

³⁶ DTS is a series of multichannel audio technologies owned by DTS, Inc.

³⁷ HDMI (High-definition multimedia interface) is a compact audio-video interface for transferring uncompressed digital audio/video data from an HDMI-compliant device to a compatible digital audio device, video projector, computer monitor, or digital television. HDMI is a digital replacement for existing analog video standards.

³⁸ DTS-HD is a lossless audio codec. It is an extension of DTS which, when played back on devices which do not support the high resolution extension, degrades to a core track which is lossy.

³⁹ HDMITM (HDMI transition minimized) is a technology for transmitting high-speed serial data and is used by HDMI video interfaces, as well as other digital communication interfaces.

4. Product Performance on Video

Extract:

[The relevant information of video quality, Sony BDF-S1 refers to it's official website (<http://store.sony.com/p/BDP-S1/en/p/BDPS1#features>). Toshiba has removed the information from global website. The information refers to Toshiba Canada (<http://www.toshiba.ca/web/product.grp?lg=en§ion=2&group=521&product=5950&category=#details>).]

In general, both players provided similar performance on video quality. Sony's adopted BD-R⁴⁰/RE⁴¹ read compatibility, BD-ROM⁴², CD-R/RW⁴³, DVD Playback, DVD+R⁴⁴, DVD+RW⁴⁵, DVD-R, DVD-RW Read Compatibility, Full HD 1080p⁴⁶, JPEG Playback, and Screen Saver. Toshiba's adopted HD DVD/HD DVD-R/DVD/DVD-R/DVD-RW/DVD-RAM⁴⁷/CD/CD-R/CD-RW, and HDMITM with 480p/720p/1080i. The HD DVD video specifications allows HDMI technology but the BD standard does not.

⁴⁰ BD-R (recordable) refers to two direct to disc optical disc recording technologies that can be recorded on to an optical disc with an optical disc recorder.

⁴¹ BD-RE (erasable) can be erased and re-recorded multiple times.

⁴² BD-ROM is a type of storage media that is used to computers and other electronic devices. It is not writable.

⁴³ CD-RW (compact disc-re-writable) is a rewritable optical disc.

⁴⁴ DVD+R is a recordable optical disc. It is similar to, but incompatible with, the older DVD-R standard.

⁴⁵ DVD+RW is a physical format for re-writable DVDs. It is incompatible with the older DVD+RW standard.

⁴⁶ Full HD 1080p is a set of HDTV high-definition video modes that are characterized by 1080 horizontal lines of vertical resolution and progressive scan. It means, the image is not interlaced as is the case with the 1080i display standard. Sometimes referred to in marketing materials as Full HD. "1080i" is an abbreviation referring to a combination of frame resolution and scan type. 1080i and 1080p are both high-definition display formats for HDTVs. The difference between 1080i and 1080p is in the way the signal is sent from a source component or displayed on an HDTV screen.

⁴⁷ DVD-RAM (DVD-random access memory) is a disc specification presented by the DVD Forum, which specifies re-writable DVD-RAM media and the appropriate DVD writers. It is writable.

5. Product Performance on Capacity

Extract:

[Discussing the issue of capacity was the main activities through the standard war.] The studios have thrown their weight behind the Blu-ray group because it expects to produce DVD's with more storage space than Toshiba's discs. (Belson, New York Times, 21 October 2005)

Certainly, the BD standard has more storage of capacity than the HD DVD standard.

6. Product Performance on Copyright Protection

Extract:

[Discussing the issue of copyright protection was the main activities through the standard war.] In recent weeks two big Hollywood studios, Warner Brothers and Paramount, that had previously plumped exclusively for HD-DVD have agreed to support Blu-ray as well--citing Blu-ray's wide support and strong copyright-protection mechanisms. (The Economist, 5 November 2005)

Certainly, the BD standard has better mechanism than the HD DVD standard.

7. Product Performance on Compatibility

Extract:

Designed to maintain full backward compatibility with current DVD disks, AOD [Advanced Optical Disc, which is co-developed by Toshiba and NEC] adopts the same bonded-disk structure as the red-laser DVD current systems now in use, including the same thickness of the substrate disk and the same process for replication. ... [The] disk capacity is 15Gbytes for a single-layer ROM disk, 30Gbytes for a dual-layer disk, and 20Gbytes for a single-layer rewritable disk. The dual-layer rewritable disk is provisionally defined as 35 to 40Gbytes. ... the BD-ROM claims 25Gbyte capacity per single-layer ROM and 50Gbytes on a dual-layer BD-ROM disk. (Yoshida & Hara, EBN, 17 Nov, 2003)

Certainly, because the HD DVD wanted to maintain full backward compatibility with current DVD discs, it sacrificed its capacity.

A3.1.6. Codes of Network Effects

The term ‘network effects’ is defined as the effects that one user of a product or service has on the value of that product for others. Product performance and network effects are less evident in the dataset than other topics, such as power, legitimacy, collective action, and discursive activity. The data about product performance can be found in related media reports and supplements, but there are very few media reports in the dataset which provide market numbers for disc players and their complementary products.

Although Nielsen Videoscanner provides these numbers, they were not available for research. For this reason, I used Euromonitor to search for the population of video game users, and the market size and yearly growth rate of PCs, video players and video games in the United States between 2005 and 2008. In addition, by comparing consumer expenditure for different sectors (audio-visual, photographic and information processing equipment against other recreational items and equipment, gardens and pets), I tried to determine why using Microsoft's Vista system did not assist the HD DVD standard. Although we cannot ignore the effect of Nintendo Wii's intervention in the game console market, the *Wall Street Journal's* report confirms that the network effects of the PS3 was greater than those of HD DVD standard.

1. Generating network effects by PS3

Extract:

*Yet Blu-ray has taken a big lead in sales of movie titles. Blu-ray discs are outselling HD DVDs by about 2-to-1 this year. That's in part because so many people who bought Sony's PlayStation 3 game console, which also plays Blu-ray discs, have bought some high-definition movies. Plus, supporters of the Blu-ray technology have had an edge so far in brokering deals with movie studios for exclusive distribution of titles. (McBride, *Wall Street Journal*, 25 September 2007)*

*...in a new survey by Sony of more than 10,000 PS3 owners, more than 80% of respondents indicated that they planned to purchase Blu-ray movies for their PS3s, and about 75% of respondents said their PS3 would be a primary device for watching movies. (Ramstad & McBride, *Wall Street Journal*, 9 January 2007)*

Based on the limited information, I was able to show that the network effects of the BD standard were greater than those of HD DVD in this standard war, a result, to some extent, of the price difference between PS3 and Xbox 360.

Due to data limitation, however, I was not able to confirm whether product performance led to network effects in this standard war. So I tried to search the relevant information in Euromonitor database.

2. Video Game Population in US

Extract:

[Based on Euromonitor's data, I searched U.S. video gaming population in 2005 to 2008. See Table 8.13.]

In the U.S., teenagers (13-19 years old) and pre-teens (7-12 years old) are the main consumers of video games consoles. The number of adult users (aged over 20) increased in 2007. Sony's PS3 may become the home entertainment center for this group because they have more money for purchasing the game consoles.

3. Market Size of Home Entertainment Products

Extract:

[Based on Euromonitor's data, I search U.S. market size of PC, video players, and video games in 2005 to 2008. I further searched their yearly growth rate in the time period. See Table 8.14 and 8.15.]

PCs received a boost in 2007 because of the launch of Microsoft's new operating system. The yearly growth rate for video games is more than that for computers and video players. Because Wii, Xbox 360 and PS3 were launched in 2006. They not only increased the overall sales figures for video, but also eroded the market of some existing video players.

4. Expenditure on the Relating Products

Extract:

[Based on Euromonitor database, there are two categories named "audio-visual, photographic and information processing equipment" and "other recreational items and equipment, gardens and pets" relating to the products discussed above. See table 8.16.]

Customers in the US have fixed expenditure in these two categories. Spending too much money on a specific product will push other products out from their shopping lists.

A3.1.7. The Codes of Additional Findings Concerning Unseen Literature

After open coding, I was able to define a new group of very interesting topics, which could be studied further in the future. All these findings are implicit in the dataset. They derive from literature and my background research.

The relationships between these additional findings and the variables discussed earlier are derived from the literature and the data. In this section, I will document the ways in which these findings emerged. The detailed discussion of this will be in Chapter 8.

1. Human Resource Management of Core Employees

This concept can be defined as the process of managing permanent employees comprising the central and foundational group that provides the skills essential to an institutional entrepreneur in a structured and thorough manner.

Extract:

...as I mentioned before, the three excellent engineers have connections with engineers in other companies. That's why they succeeded in establishing the new format.

(Interview in Japan)

My Japanese interviewee told me that the existence of the three 'master' engineers was one of the factors which won this standard war. This study has outlined their role in the BD camp. It is not only their knowledge that can be seen as competitive advantage,

however; their personal connections were also very important as a way of winning attention and motivating other companies to join the project of change. This issue has been discussed in studies of human resource management (e.g. Lepak & Snell, 1999), but could be further examined in future studies of institutional entrepreneurship. As a consequence, HRM of core employees may intervene in the relationship between the resources of the institutional entrepreneur and the activity of institutional entrepreneurship in standard wars. Higher performing HRM of core employees may positively reinforce the relationship.

2. Personal Social Capital

This finding is based on theoretical work on human resource management studies, rather than on media reports, and is defined as the provision of personal resources for social benefit. Human resource management studies suggest that, by using personal social capital, organizations can explore and exploit opportunities, and create value. Personal social capital also mediates between human resource management of core employees and collective action.

3. Influence of the Media

It can be defined as the ways in which mass media affect how their audiences think and behave in institutional entrepreneurship. My subject as an undergraduate was Journalism, so I am familiar with the outcomes and performance of the media in mass communication. No media reports about this standard war outline the influence of the media itself. However, I recognize that the influence of the media may intervene in the

relationship between the resources of the institutional entrepreneur and the activity of institutional entrepreneurship in standard wars. This is because journalists' analyses of standards may influence the perceptions and interpretations of the audience. In addition, the influence of the media can intervene in the relationship between institutional entrepreneurship in standard wars, and its network effects and product performance. This is because product reviews and analysis in the media can also influence the views of the audience. In this way, the media may play a critical role in a standard war. The media also can be seen as an indirect stakeholder in a standard war. Although the media are not directly involved in standard wars, they have the power to influence them, because they can influence the interpretations and perceptions of their audience. This is why the BDA has a spokesperson to maintain its relationship with the media.

Appendix 4. The List of Critical Concepts in this Study

Institutional entrepreneurship: Activities of actors who have interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing one (Maguire, Hardy, & Lawrence, 2004: 957).

Critical stakeholder: Reputational actors who have critical resources for the organization's R&D activities, manufacturing and marketing as part of processes of technological standard change. The participation of such stakeholders directly contributes to the new standards of focal firms, in both functional and symbolic terms.

Standard: A set of specifications to which all elements of products, processes, formats, or procedures under its jurisdiction must conform (Tassey, 2000: 588).

Standard war: The process of which a focal firm competes with a number of other firms who propose alternative plans until one new technology emerges as the victor.

Collaboration: Cooperative, inter-organizational relationships which rely on neither market nor hierarchical mechanisms of control to ensure cooperation and coordination and, instead, are negotiated in ongoing, communicative processes (Lotia & Hardy, 2008: 366).

Discursive activities: The actor display[ing] or tr[ying] to draw other people's attention to the meaning of an object or action that goes beyond the object or action's intrinsic content or functional use (Zott & Huy, 2007: 70).

Network effects: The effect occurs when the value of a product or service to a consumer is contingent on the number of people using it.

Institutional entrepreneurs: Actors create a whole new system of meaning that ties the functioning of disparate sets of institutions together (Garud, Hardy, & Maguire, 2007: 957).

Institutions: Supra-organizational patterns of human activity by which individuals and organizations produce and reproduce their material substance and organize time and space (Friedland & Alford, 1991: 243).

Power: The ability to get what you want through attraction rather than through coercion.

Legitimacy: 'A generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions' (Suchman, 1995: 571).

Collective action: A set of communicative practices which take into consideration the engagement of, and interactions between organizations.

Critical stakeholder management capability: A process of managing and responding to the expectations and requirements of any critical stakeholder who has an critical resources in a project or will be affected by its deliverables or outputs.

Backward compatibility: The ability of a new storage device to work with input generated by an older device.

Understanding expectations: The process of recognizing the interests and requirements of critical stakeholders in standard wars.

Responding to requirements: The process of replying the expectations of critical stakeholders in standard wars.

Seeking exclusive support: The process in which the exclusive support of stakeholders is sought in standard wars.

Giving incentives: The process in which tangible or intangible resources are used to attract the engagement of critical stakeholders.

Collaboration structuring capability: A process of establishing formal structures and rules, in order to manage effective collaborations in which divergent members exchange and share opinions and resources in order to achieve common goals.

The portfolio of institutional entrepreneurs: The set of direct ties possessed by an institutional entrepreneurs in a standard war.

The structure of membership: An result of the process of professionalization, and a set of rules which explicitly defines the responsibilities and obligations of all members of a collaboration.

R&D activities: a “systematic investigation or experimentation involving innovation technical risk, the outcome of which is new knowledge, with or without a specific practical application of new or improved products, processes, materials, devices or services” (Rogers, 1998: 12).

Frequent communication: The ways in which institutional entrepreneurs have formal communications, involving exchanging and sharing opinions and approving decisions, with other members of collaborations.

Organizing promotion: The use by institutional entrepreneurs of collaborations to define campaigns and utilize strategies, in order to promote and target standard and relevant technologies to relevant audiences.

Framing: the use of various verbal and non-verbal discourses to construct the identification and expression of a novel understanding of a problem, and to explicitly provide compelling reasons to support the new vision being promoted.

Establishing collaborations: To arrange a system of act of working with another or others on a joint project.

Promoting: Giving publicity to a standard, collaboration and/or in order to increase its sales, adoption and awareness among the public.

Undermining: The active use of discourses to implicitly or explicitly erode or impede the base of a rival's standard or collaboration.

Debating: The ways in which institutional entrepreneurs deliberately defend and explain their actions and behaviors when these are challenged by their competitors in the media.

Spokespersons: Individuals who are responsible for representing a company in the media.

Product performance: Ways in which the technical quality and price of products are developed by institutional entrepreneurs and have to satisfy stakeholders and customers.

Human resource management on core employees: The process of managing permanent employees comprising the central and foundational group that provides the skills essential to an institutional entrepreneur in a structured and thorough manner.

Influence of the media: The ways in which mass media affect how their audiences think and behave in institutional entrepreneurship.