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Abstract:

Standards have become one of the most important elements in technological development in ICT. However, standard-setting process is a complex coordination between different players. One of the strategies is the inter-firm alliance during the pre-standardization stage. Yet, it remains unclear how the inter-firm alliances occur during the process. Using the case study of the current developing technology in ICT industry and interviews with people who are familiar with standardization work, this paper points out two types of partnerships in the pre-standardization with the analysis of the firms' motivation of having the partnerships. Besides to promote the technology as the standard, two other motives of having partnerships are also discovered.

Keywords: alliances, standards, standard-setting process

Introduction

Various innovations in Information and Communication Technology (ICT) have shown a significant development in the last decade. Major innovative firms introduce their new technological development in a particular technology to the market, in order to stay competitive in the ICT markets. This innovative phenomenon has also led to the growing numbers of technologies for similar application among different players. For example, not long after the Japanese technology integration, NTT DoCoMo's *i-mode*, entered the European market, Vodafone, one of the biggest service providers, also launched the *Vodafone live!* to challenge the Japanese product. Although each technology does not have exactly the same feature, both technologies are operated within a similar application, i.e., the Third Generation (3G) of Global System for Mobile Communication (GSM).

Thus, in the technological development process, the ICT firms might have diverse technologies for a similar application. All firms want to stay competitive and innovative by keep inventing new technologies, although most innovations are associated to big firms. Besides the tight competition, the availability of diverse technologies might also create a chaotic situation in the market, because the assorted technologies are not always compatible. Still using the same example as mentioned above (*i-mode* and *Vodafone live!*), there is an indication of a current competition in mobile communication between two big mobile communication service providers, KPN Telecom and Vodafone, in the Netherlands. As a result, end-users are often faced with various alternatives that lead to confusion in choosing the preferred technologies for a similar application. Both technologies offer an advance-messaging feature, Multimedia Messaging Service (MMS), as an improvement of the early developed Short Message Service (SMS).

To converge these diverse technologies in ICT industry, standards have become one of the most important elements in technological development. Global market needs global and single technical standards for various applications as well. The standards should be open and compatible, which means publicly available and no essential Intellectual Property Rights (IPRs) exist. This kind of standard is known as an open standard (Bekkers, 2001). Unfortunately, competition among manufacturers impedes the emerging of different systems and instigates complex circumstances in standard-setting processes. Every manufacturer is not only competitive in gaining market shares, but also in proposing each technology as the standard. Therefore, there

is a complex coordination among firms in the pre-standardization stage, with negotiations over the proposed technologies among firms (Lim, 2002).

Despite the complex circumstances among firms in standard-setting process, some ICT manufacturers tend to be more cooperative with the other firms in developing their technologies. Firms work closely with each other to develop standard technology and to sponsor adoption of a standard (Axelrod et al., 1997). This cooperative behavior even leads to collaboration, particularly in inter-firm research and development (R&D), where some big ICT players have been revealing their partnerships in developing their technologies for some time now. As the matter of fact, alliances in ICT standard-setting process have been a new trend (Lassner, 1995). Mohr (2001, p.76) argues that an important reason for collaborating with competing firms is to define standards for new technologies. With collaboration, firms can stimulate the market growth and the overcoming customer anxiety about choosing the wrong technology. The market growth from the standard is along with the objective of formal standard bodies, like International Telecommunication Union (ITU) for worldwide telecommunications and European Telecommunications Standardization Institute (ETSI) for European region. Moreover, governments play a role in persuading the standard harmonization, as European Union legislation encourages the collaboration on innovative technical specifications through harmonized standards.[2] One of the government's interventions is to stimulate and facilitate the development of standards for technology and conduct (Nooteboom, 1999, p.214).

Collaborative technological development is not somewhat new in academics. This can be seen from literature that discusses the trends and patterns of inter-firm R&D partnerships (Hagedoorn, 2002; de Laat, 1997). Using a great number of data, the literature shows how dynamic inter-firm R&D alliances are. As the matter of fact, R&D alliances have become a trend in the past decades, and have been rapidly increasing in the last few years. The R&D alliances mostly are mostly associated with the high-tech industries, namely the IT industry, pharmaceuticals, and aerospace and defense (Hagedoorn, 2002). Related to the coalition in standard-setting process, Axelrod et al. (1997) make a model on the formation of the coalition using Nash equilibrium based on the case of UNIX operating standard-setting in 1988.

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[2] See Berg, C. (2002) "Standards help to remove barriers", *Enterprise Europe* No.6, January-March 2002.

Considering the current phenomena as described above, this paper tries to discuss how firms would cooperate in the form of alliances in ICT standard-setting process, in particular during the pre-standardization stage (Lim, 2002). To be more specific, this paper describes what kind of alliances those firms form in attempting the standard-setting process and the motivation that drives them to the inter-firm alliances during the early period of the standard-setting process. During the pre-standardization stage, firms are involved in a negotiation process (ibid.). Thus, the coalition occurs as the firms' strategies to deal with the negotiation process and as the outcome of negotiation process. As the case study, this paper uses current developing technologies in ICT, particularly the mobile payment in mobile communication industry.

As the result, there are two types of partnerships in ICT standard-setting process. The first type is the close partnership, which involves only a limited number of firms. The second type is the open partnership, which takes the form of a forum with memberships. The main motivation for firms in having partnerships is to create and promote single and open standards with affordable R&D cost.

Methodology

This paper only discusses the early period of the standard-setting process, i.e., the pre-standardization stage (Lim, 2002). The pre-standardization stage is considered to be the most important and interesting stage in standard-setting process, because the occurrences during this early period determine the efficiency of standard-setting process and the quality of the standard. In this stage, the actors, who are the firms in ICT industry, come with each own strategy and proposed each own technology. Then they have the negotiation process in choosing the technology to be recommended as the pre-standard outcome to the formal standard body (ibid.). Therefore, the analysis is more on the micro level, by studying firms' strategies based on how the firms interact each other.

Furthermore, this paper is designed as a case study research (Yin, 1994). The chosen topic to study the collaboration phenomena in pre-standardization stage is the current developments and events in ICT industry, with more focus on the mobile payment. The data was collected as the secondary data, and categorized into two types of data. The first type is the data collected from reports and news about latest development and current event in ICT industry, particularly in mobile payment. The

second type of data is interviews conducted with a number of individuals who are familiar with the standardization work.

Pre-standardization stage in ICT

There are two stages in ICT standardization process, i.e., the pre-standardization stage and the standardization stage (Lim, 2002). The difference between both stages is the formality degree due to the involved actors. During the pre-standardization stage, the players are the producers and co-producers who attempt to set up the product standard. Those actors of pre-standardization stage negotiate the technology to be proposed as the standard. They compose the proposal and submit the proposal to the Technical Committee (TC) of the formal standard body. On the other hand, in the standardization stage, the actors are the members of the formal standard body. The experts that are grouped in the TC of the formal standard body examine the proposal before they make their decision by voting among members. If the result of the voting is an approval to the proposal, then the standard can be established.

Pre-standardization stage is considered as the most important period in ICT standard-setting process. This is where the embryo of the standard is born. As mentioned before, the events during this period influence the duration of the process and the standard resulted at the end. During the pre-standardization stage, the involved firms prepare a proposal of the standard promoted technology. Before these firms generate the proposal, they negotiate which technology should be chosen and promoted as the standard. The negotiation process is resumed to the proposal preparation, until the proposal is submitted to the TC of formal standard body. The result of the pre-standardization stage is the pre-standard outcome, i.e., when the proposal is accepted as the working program of formal standard body (Lim, 2002).

The firms involved in standardization, including the pre-standardization stage, have different interests and strategies for standard-setting process. They might bear political goals and economic interests into arena (Schmidt & Werle, 1998, p.85). Since the pre-standardization stage consists of several negotiation phases, the firms should be prepared with the information about their opponents before they attend the negotiation process (Lim, 2002). One of the firms' strategies in preceding the negotiation process is equipping their delegations with negotiation skills (Spring et al., 1995). As a result, the technical quality of the negotiated standard might be sacrificed to the pragmatic needs for an agreement and political considerations

unrelated to the standard or technology under study (Lassner, 1995; Schmidt & Werle, 1998, p.97). To achieve their interests through standards, the firms move toward the pre-standardization stage with different strategies. There are a number of strategies, such as devising their IPRs strategy (Bekkers, Verspagen & Smits, 2002), or entering alliances with other firms (Axelrod et al., 1997).

Types of partnerships

In literature, R&D partnerships are mostly related to two categories, i.e. equity-based joint ventures and contractual partnerships (Hagedoorn, 2002). These R&D partnerships refer to the inter-firm collaboration between two or more firms who share their R&D activities, and remain independent economic agents and organizations (ibid.). Joint ventures are the most common partnerships between ICT firms in the last decades. The typical form of joint ventures is semi-independent, means that the joint ventures are hierarchically below their parent firms who have the control in driving the joint ventures to the market. On the other hand, the contractual forms of R&D partnerships are becoming more and more important, in particular in project-based partnerships (ibid.). The collaboration undertakes the shared resources between firms, such as human resources, facilities and capitals.

Apart from the discussed common style of partnerships, there are two types of partnerships between ICT firms in developing their technologies, particularly in supporting mobile payment. These two types of partnerships can be matched to the definition of the 'horizontal' alliances between competitors, or the 'diagonal' alliances between firms in different industries (Nooteboom, 1999). Starting with the first type, the closed partnership, i.e., an independent specific partnership between two or more firms in developing a certain technology. For example, Royal Philips Electronics teams up with Sony Corporation in developing a new radio communication technology called Near Filed Communication (NFC), which will be promoted as an open standard in wireless application.[3] This technology will allow a communication network between devices that are supported by NFC interfaces. The wireless NFC will be operated at 13,56 MHz frequency and will be able to cover up to 20 centimeters between devices, such as mobile phones, digital-cameras, PDA, PC,

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[3] Source: http://www.kompas.com/teknologi/news/0209/06/003309.htm

laptops, game consoles and other peripheral devices with NFC-enabled. NFC will also be complemented by smart-key and smart-card to support mobile payment.

Another example is Gemplus, who partnered with Enterprise Payment Platform (EPP) provider iPIN. This partnership offers secure mobile payment solutions designed for the pre-paid mobile market called *GeM-Reload*, by fuses Gemplus' expertise in Subscriber Identity Module (SIM) card technology and Over The Air (OTA) platforms with iPIN's flexible EPP.[4] As the last example in the close partnership, Vodafone Sweden, IBM and application developer isMobile collaborate to provide a new mobile solution designed for field workers based on *Blå Coordinator* (Blue Coordinator). For this collaboration, isMobile provides the software, IBM is responsible for implementing and integrating the service, and Vodafone Sweden handles the subscriptions, positioning service and mobile datacoms.[5]

One of the goals of the close partnership is to promote standards. However, the standard promoted by the close partnership can be ambiguous between *de facto* standard and *de jure* standard. For instance, when the firms who are involved in the close partnership have invented a new technology as the outcome of the partnership, and the technology has the opportunity to be launched to the market as the new technology. The technology may later become the dominant technology and be adopted by the market as *de facto* standard. On the other hand, the firms can also propose the technology to become a standard through negotiations with other firms and formal standard body. If other firms accept the negotiated technology, the technology is proposed as the pre-standard outcome (Lim, 2002). Furthermore, when formal standard body approves the pre-standard outcome, the technology may later be published as *de jure* standard (ibid.).

The second type of partnerships is the open partnership, which is amicable to any interested firms and specified to develop a certain technological application theme. In many cases, the consequence of the open partnership is the establishment of a society or an organization with membership. Typically, the organization formed by open partnership often determines general conditions to the firms who join as the members of the organization.

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[4] Source: http://www.mobilecommerceworld.com (Mobile Commerce, 17 June 2002);
http://www.gemplus.com/companyinfo/press/2002/telecom/gemreload_ipin.html
[5] Source: http://www.mobilecommerceworld.com (Mobile Commerce, 30 September 2002).

Unlike the dual type of standards initiated in the close partnership, the typical type of standard created in the open partnership is *de jure* standard. The open partnership cooperates with other organizations, e.g., formal standard bodies. Some formal standard bodies even support and assist the open partnership in pursuing the standard setting, by delegating their members to the open partnership. To illustrate the open partnership, there are two societies used, i.e., the Open Mobile Alliance and the Mobile Payment Forum, as described below.

The Open Mobile Alliance

The mobile communication industry has been growing rapidly in the past ten years. New mobile technology features have been tremendously innovated and enhance the mobile communication growth. Such progression is developed by numbers of firms in mobile communication, such as information technology companies, network providers and mobile operators. The various numbers of technologies from different firms may lead to diverse applicative manners and incompatibility issues.
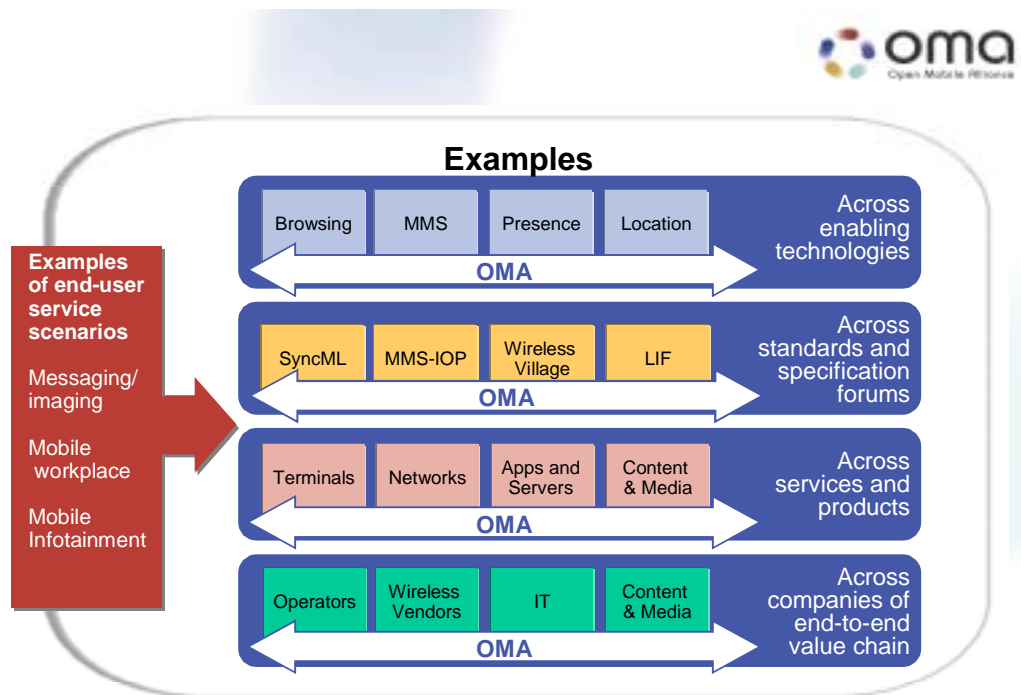
Fig. 1. Examples of end-to-end interoperability across value chain and specification forums (Source: Open Mobile Alliance Principles, 2002).

To avoid such misapprehend state, in June 2002, nearly two hundreds companies established the Open Mobile Alliance (OMA), which was created by

consolidating the Open Mobile Architecture initiative and the Wireless Application Protocol (WAP) Forum.[6] The member companies cover the dominant players in mobile communication, such as mobile operators, device and network suppliers, information technology companies, application developers and content providers. One of the OMA's objectives is to achieve interoperable mobile services and networks through open standards.[7] Together with the Location Interoperability Forum (LIF), SyncML, Multi-media Messaging Service Interoperability Group (MMS-IOP), and Wireless Village, OMA focuses on standardization work by signing a Memorandum of Understanding (MoU). OMA also works closely with some other standard-setting organizations, i.e. the Third Generation Partnership Program (3GPP), Third Generation Partnership Program Two (3GPP2), CDMA[8] Development Group (CDG), the GSM Association, and the Java Community Process (JCP). The collaborations are expected to ensure the interoperability and accelerate the adoption of developing technologies in the market.

The Mobile Payment Forum

Following the rapid growth in the mobile communication industry, mobile technology has also stretched to the banking and finance industry, particularly in the payment industry. The extending technology is indicated by the rapid growth of mobile commerce devices and results a new technology called mobile payments. A collaborative development of some technical frameworks, such as magnetic stripe and chip cards, point-of-sale terminals and Asynchronous Transfer Modes (ATMs), have been successfully undertaken and imparted the base for further development and innovation of mobile payments.

From the user's point of view, the consumers get more and more familiar, and benefit from the sophisticated payment system using payment card. A survey shows that up to 93 percent of current internet transactions have been operating payment cards.[9] This number will even get higher in the future due to the end-user's convenience from the rapid development and innovation in the infrastructure of payment system and mobile telecommunications.

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[6] See http://www.openmobilealliance.org/documents.html
[7] The first principle of OMA is products and services are based on open, global standards, protocols and interfaces and are not locked to proprietary technologies.
[8] CDMA: Code Division Multiple Access
[9] Source: http://www.mobilepaymentforum.org/background.htm

This development, however, leads to a circumstance where various players in wireless internet and mobile commerce technologies, banks, telecommunication operators, handset manufacturers and vendors are partially and individually developing numbers of technology to support mobile payment solutions. As a result, the emerging technological development hampers the growth of mobile payment industry and the market becomes fragmented. The first movers would benefit from this situation by gaining de facto standards and major market shares respectively.
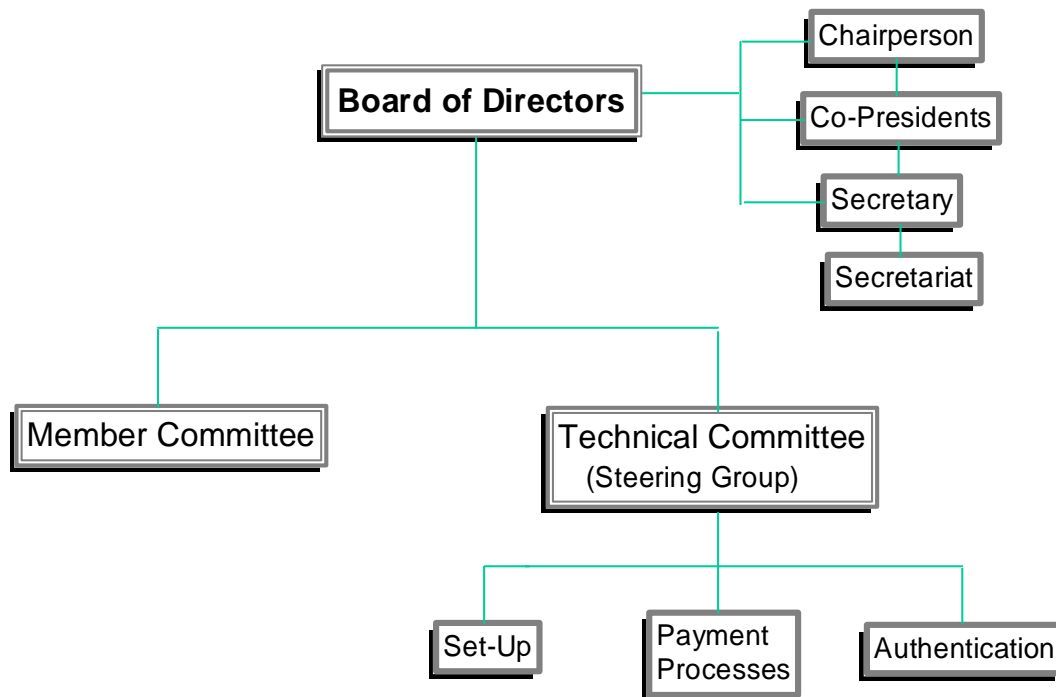
Fig. 2. Mobile Payment Forum Structure (Source: Mobile Payment Forum White Paper, December 2002)

Realizing the phenomena of open and global standard crisis in mobile payments, some financial firms initiated a Mobile Payment Forum, a global and cross-industry forum, which brings together leading organizations from the mobile and financial industries to create a foundation for standardized, secure and authenticated mobile payments.[10] The forum's membership, which was initiated by American Express Company, JCB Co., Ltd., MasterCard International, and Visa International, includes key financial institutions, telecommunications operators, wireless-device manufacturers, merchants, content providers, and software and hardware developers and vendors. In June 2002, new board members from big telecommunications players,

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[10] Source: http://www.mobilepaymentforum.org

i.e., Hutchison 3G, NTT DoCoMo, Oracle, Telecom Italia Mobile and Vodafone, joined the forum, with the efforts to standardize the features and functions needed to deploy secure and convenient mobile commerce solutions.[11]

Motivation

The motivation of companies to enter the R&D partnerships has been an interesting subject (Hagedoorn, 2002). Noteboom (1999) describes the motives for alliances as "the need to cooperate in order to maintain flexibility, core competence and the incentives that arise from autonomy, while utilizing complementary resources for both efficiency and learning". There are two main motives that are stressed in this context, i.e., the cost-economizing and the variety of strategic (ibid.). The cost-economizing means the lower R&D costs because firms share the R&D activities cost with their partners. For example, firms can share the cost of setting up a new laboratories and buying the equipments. On the other hand, the variety of strategic means firms may share the risk through partnerships. For instance, when firms decide to start an R&D activity for developing a new technology with high uncertainty future of the technology.

Through alliances in standard-setting process, there are some advantages considered by the ICT firms and become their motivation to form alliances in standard-setting process. The obvious advantages are in-line with the two main motives as described above, i.e., the reducing investment costs and risk sharing. The other advantages could be to switch competitors to partners and to remove potential competing standards (Lassner, 1995). Firms, in particular smaller firms, may also increase their power by resulting larger organizations from their relationships.[12] The smaller firms may feel certain when they adopt the dominant standards, which also indicate their support to the dominant firms. Last but not least, another advantage of alliances in standard-setting process is the acceleration of the process itself, due to the limited membership and area of work (Spring et al., 1995). This advantage is remarkably relevant to the close partnership, where there are only limited firms involved for a specific target. Thus, ICT firms take these advantages of partnerships into account and start forming alliances to develop the standard.

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[11] Source: http://www.mobilepaymentforum.org/pr050502.htm
[12] The indication is when smaller firms adopt dominant standards that belong to bigger firms.

In the close partnership, the motivation might be in-line with the main motives as described by the literature. Firms want to reduce the R&D costs by sharing the cost with their partners, for instance by combining their knowledge or their facilities. Firms also share the risk of being rejected when proposing the technology to the standards bodies to be published as *de jure* standard. Since there is a possibility to accelerate the standard-setting process, firms consider having alliances with expectations that less time also means less cost for the standard-setting process. But as the most important strategic reason, firms can form an alliance in sending their delegates to the standard-setting committee and may have a higher opportunity to win the negotiation of standard-setting process (Lim, 2002).

On the other hand, in the open partnership, there is another motive that also differs the nature of the partnerships. Since the open partnership creates an organization, automatically the organization also creates its own nature with own objectives. Thus, besides the two main motives like mentioned in the close partnership, there is one motive that is similar to the objectives, i.e., to create and promote a converged technology to be published as standard.[13] The forum develops a certain new technology for an application. In another way, the forum converge numbers of technologies for a same application to have single standard technology. Later on, the chosen technology is promoted as the open technical standard. With the open standard, end-users may obtain the technology without any difficulties, and the technology is compatible with other applications. The compatibility open standard also means end-users may use the technology from any manufacturers who produce the similar application.

Conclusion

There are two types of partnerships in pre-standardization stage in ICT industry. The first type is the close partnership, which is an independent partnership between limited numbers of firms in developing a certain technology. The second type is the open partnership, which forms a structural organization developing a specific technological application theme. The main objective of both type partnerships is to jointly develop technologies that can be promoted as standards.

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[13] Since the forum teams up with a working group a several standard bodies, the proposed technology would be published as *de jure* standard.

In the close partnership, there are two main motives for alliances, i.e., the cost-economizing and the variety of strategic. Particularly in the pre-standardization stage of standard-setting process, the most important motive is the strategic motive to have allies, which can also be one of the strategic preparations before the negotiation process. By having allies during the negotiation process, firms may have bigger opportunity to win the negotiations during standard-setting process through alliances.

In the open partnership, besides the cost-economizing and the variety of strategic motives, the main motive is to create and promote a single and open technical standard. Together as a forum, some ICT firms create a single technology for a certain application. Later on, this technology is promoted as an open standard, which is available for any users and compatible with other applications.

Further research

This paper discusses an organization as the study case, i.e., the mobile payment forum. It is clear that one of the forum's objectives is to support its members. Nevertheless, it will be more interesting to analyze the mechanism within the forum itself, for instance the mechanism of the decision making, in particular related to the standard-setting process. Therefore, for the future research, an observatory research will be conducted to have a clear description of the mechanism of the forum.

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