
The strategic consortia movement in standardisation

Masami Kajiura

Faculty of Business and Commerce,
Aichi-Gakuin University,
12 Araike, Iwasaki-cho, Nissin-city, Aichi, Japan
Fax: 81-561-73-9305
E-mail: msmkj@dpc.agu.ac.jp

Abstract: Formal standardisation has been increasing in recent years. This standardisation is conducted by international formal standardisation organisations (i.e., ISO, IEC, ISO/IEC JTC1) and the consortium plays an important role in this process. The consortium is mainly established and managed by competitive multinational companies (MNCs). The formal standard-oriented consortia have appeared as a mutual alliance between MNCs.

This paper examines the consortium contents (i.e., the origin, the cause, formative process, variety and characteristics). Such consortia deal with diffusion of technology standards. Two consortia, Ecma International and JAISA cases, relating to automated identification technology (AIT) are introduced in the article. Also, this article shows how structural changes in the information communication technology (ICT) industrial market affect the formation of consortia and standardisation. This structure change has affected diffusion of technology. The analysis addresses historical significance and covers organisational sociological approach literature. Finally, the author proposes a model of the competition predominant structure of standardisation that illustrate success business model with a flow chart.

Keywords: consortium; standard; standardisation; automated identification technology; AIT; Ecma International.

Reference to this paper should be made as follows: Kajiura, M. (xxxx) 'The strategic consortia movement in standardisation', *Int. J. Manufacturing Technology and Management*, Vol. X, No. Y, pp.000–000.

Biographical notes: Masami Kajiura worked for the European MNCs for many years as Technical Manager. He held visiting position to research into ICT standardisation in Yokohama National University in 2004. He works for Aichi Gakuin University since 2000. He is a Full Time Professor at Aichi Gakuin University since 2006 and giving lectures in International Business at Faculty of Business and Commerce and Commerce Graduate School. He received his BS degree in Hokkaido University in 1977, MBA degree in Yokohama City University in 1997 and PhD degree in Yokohama National University in 2000.

1 Introduction

In high-tech industries, such as automated identification technology (AIT), radio frequency identification (RFID), bar coding and biometrics, etc., consortium-based

formal standardisation has been occurring in recent years in the world (Telecommunication Technology Committee, 2006). For instance, EPC global (RFID), AIM global (AIT), biometric security consortium (biometrics) and EBF (biometrics) have been established and kept active. These consortia were created to provide technical assistance for the development of generic AIT standards.

Standards can be classified according to distinctive elements as describe latter. In this paper, 'needs related to actor-dependent category' is applied: as traditional de facto standards (a standard arises gradually as the market itself decides upon certain solutions that are perceived in the end as standards), de jure standards (the development of standards is to understand them as a result of the fact that a group of people have sat down to discuss and agree upon a technical solution in the form of standard which will then be introduced on the market) and formal standards (standards that are formed in formal standard organisations such as ISO, IEC,ISO/IEC JTC1). As standard result from the developing process called standardisation.

ICT industries have now become global. In ICT industries, many consortia in which multinational companies (MNCs), standard developing organisations (SDOs), agencies and other actors participate, have been formed. Many organisations worked on activities that were committed to work on standardisation (Hallström, 2004). A standard consortium is an alliance of these actors (Egyedi, 2006). As shown in the following cases, occasionally, the consortium comes into play as fast track and PAS submitter, trade association and other form. Basically, the consortium can be classified into four groups (De Vries, 1999). They are organisation in relation to SDOs, special standardisation organisations (SSOs), cooperation standardisation group between competitors and R&D related alliance group.

There are two major changes in the ICT market. The first is an increase in the number of consortia. Originally, the consortium started as an organisation for high-tech R&D. The standardisation of established consortia in the ICT field was observed in the USA in the 1980s (Cargill, 1997). Subsequently, in the late 1990s, the establishment began to prosper (Table 1). The second major change is the standardisation trend-shift. MNCs are inclined towards formal standard setting by the consortium and away from de facto standard setting on their own (Table 3). This trend is called the consortia movement. The trend is more remarkable since 2000, as shown in Table 3.

Research into competitive strategy theory thereafter refers to this phenomenon. In addition, there are papers, which show that standardisation is created by SDOs. For example, Porter (1985) points out that the groups such as consortia in close competition motivate and accelerate the creation of new industry standards. However, Porter (1985) does not explain the mechanisms and processes occurring in the standard setting that precedes these groups. Excluding this consideration, the approach of competitive strategy theory does not clarify distinctive activities or the picture of technology diffusion. Such an approach lacks a generic view of the consortium.

Many actors have stakes and may get involved in standardisation and consortia. These stakeholders distinguish two typical roles in standardisations: producers/vendors and users (De Vries, 1999). It is necessary to make the roles of producers/vendors and users clear. In marketing science, to examine the relationship between producer/vendor and user is main object and common approach. In this paper, I also try to examine the relationship of them. In the following, the author tries to clarify standards set by the consortium to examine literature. The paper includes origin and developing process of the

consortium and discusses two cases (Ecma International and Japan Automatic Identification Systems Association (JAISA)).

2 Research on the consortium

2.1 Definition of the consortium

Regarding the standards consortium, there is as yet no stable formal definition. In practice, it can cover a variety of alliances (Egyedi, 2006). Researchers report specification groups (Updegrave, 1995), R&D oriented consortia, research consortia (Updegrave, 1995; Weiss and Cargill, 1992), implementation and application consortia (Weiss and Cargill, 1992), strategic consortia (Updegrave, 1995), etc. Their concepts are independent, specific and fragmentary and thus, do not enable a generic picture of a consortium.

However, De Vries (1999) specifies the characteristics of a typical consortium related standardisation and R&D. They are as follows:

- 1 Organisations that do not develop standards themselves, but in one-way or another perform standardisation-related activities in relation to SDOs (formal standard organisations, sectoral or specialised standardisation organisations and/or governmental standardisation organisations).
- 2 Specialised standardisation organisations such as industry sector groups, whose purpose is to develop standards. The membership is sometimes open to all interested corporations, universities and governmental agencies.
- 3 A form of cooperation between competitors to agree on standards: a broad grouping of different companies pursuing a common objective, usually attempting to create a common approach or de facto standard in a particular technology field. Often a consortium is formed to counteract the influence of other competitors.
- 4 Organisations that the companies cooperate in R&D to share cost and, as part of the project, agree on standards.

De Vries' (1999) definition shows that the consortium characteristics contain forming standards and R&D. The definition of consortium used in this paper conforms to that of De Vries (1999), mentioned above.

2.2 The increase in consortia

As described above, the establishment of consortia became prosperous in the late 1990s (Table 1). This is the first major change in ICT standardisation. According to the Telecommunication Technology Committee (2006) report, a total of 122 consortia have been established, 85 of which were established after 1995. About ten consortia have been established every year.

There are three categories of consortia activities: information communication, information technology and services. Information communication is related network communication technologies such as mobile and telecommunication. Information technology is related computer technologies such as hardware, software and LAN.

Services are related internet, multimedia and e-commerce activities. Priority and activity of the three categories are entirely different. In information communication, it is clear that standardisation of interconnection technology is the first priority of consortia. For information communication, network extension is of primary importance. On the other hand, in information technology, the first priority is to set standards of compatibility and implementation technologies. With respect to services, marketing activities, which diffuse technology standards to develop users, i.e., to gain popularity in the market, occupy the highest priority.

Table 1 The number of consortium

<i>Activity purpose</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2006</i>
Standardisation of de facto standards	9(16)	18(23)	24(23)	18(18)	16(17)
Standardisation of formal standards	9(16)	9(12)	12(12)	10(10)	12(13)
Implementing specification and interconnectivity	23(41)	28(35)	26(25)	36(36)	38(43)
Others	15(27)	24(30)	41(40)	36(36)	28(30)
Number (%)	56(100)	79(100)	103(100)	100(100)	94(100)

Source: Telecommunication Technology Committee (2006), Table 2.5, summarised by author

2.3 Formal standard setting increase

The second major change is to trend-sift when setting standards. The concept of industry standards is in Table 2.

Table 2 The concept of industry standards

<i>Research sources (publication) (country)</i>	<i>Concept (including relationships)</i>
Sullivan (1983) (US)	The concept of the ways and the means of activities (production, transportation and marketing), which are done by the manufacturing company. Investment for the purpose of making profit.
Gibson and Rogers (1994) (US)	It has a purpose of correctly transferring basic technologies in communication through product standard transfer packages (STP) from the developer to the user.
Schmidt and Werle (1998) (Europe)	The relationship of de facto standards to compatibility and open standardisation. Basically, the standard has 3 types. <ul style="list-style-type: none"> • mandatory standards in which the government participates • de facto standards in which the market participates • committee standards in which various stake holders participate.

Source: Original papers and summarised by author

Table 2 The concept of industry standards (continued)

<i>Research sources (publication) (country)</i>	<i>Concept (including relationships)</i>
De Vries (1999) (Europe)	Makes a standard concerning science and technology and testing ‘the international formal standard’, ‘the government standard (the national-standard): being semi-formal’ and the ‘de facto standard’.
Cargill (1997) (US)	ICT standard composition types. <ul style="list-style-type: none"> • Common technological model (world general model) intended by the vender. • Adaptable model (specific business model) for the intent of the individual user. Industry standard is type.
Spivak and Brenner (2001) (Europe)	They don’t use the term ‘de facto standard’; the standards of science and technology test ‘the level of the standardisation’. It extends a level of range for the company, the industrial world, the local government, the state and the international world. Industry standard covers industrial business world level.
Yamada (1997) (Japan)	Basically, it is separated into de facto standards (a standard which dominates the market as a result of market competition) and de jure standards by formal SSOs. However, standardisation processes that are not based on the two types are now increasing.
Uchida (2001) (Japan)	A standard has four types taken from the ways of decision-making and the existence or non-existence of standardisation organisation. <ul style="list-style-type: none"> • the competition predominant type (market competition decision, no standardisation organisation) • the consortium type (discussion decision, no standardisation organisation) • the cooperative type (market competition – standardisation organisation exists) • de jure standard type (discussion decision, standardisation organisation exists).

Source: Original papers and summarised by author

Table 3 shows that Japanese MNCs tend toward formal standard setting and away from de facto standard setting. Firstly, in 418 cases of standard setting from 1995–2006, de facto standard setting occurred 70% of the time and formal standard setting occurred 30% of the time in the late 1990s. Secondly, however, the trend changed after 2000, when the two standard-setting types became almost even. This trend shows that competitive de facto standard-setting in the market has become more difficult for MNCs. Therefore, they have joined with suitable consortia and distanced themselves from the practice of setting de facto standards unilaterally in favour of the more logical and reliable process of formal standard setting. Regarding this trend, Warner (2006) states that ‘firms are increasingly turning toward formal standard-setting and standard-development organisations as a means of circumventing market battles’.

To avoid market failure and losing a standards competition, firms seek institutional intervention from SDOs (Hawkins, 1999; Ferrel and Saloner, 1988). This recourse to formal standards is a threat to markets.

Table 3 Setting de facto standards and formal standards of Japanese MNCs

<i>Years</i>	<i>De facto standards</i>		<i>Formal standards</i>		<i>Total number</i>	
1995–2000	158	68.7%	72	31.3%	230	100%
2001–2006	93	49.5%	95	50.5%	188	100%
	251		167		418	

Source: Takeda (2007)

3 Structure change

Corey (1997) describes relations between standardisation and the consortium as follows: a consortium composed of influential companies sometimes has formal standard setting in the ICT area as its purpose, in order to occupy much of the total product output. This is because it supports the trend of a horizontal industry market structure, which can be seen clearly in the example of the computer industry. This example works well because it is especially advantageous in this field to secure a system of interconnectivity with a competitor's products, since popularising a system builds competitive predominance. In addition, system formation and technological specifications must be prescribed by formal standards. Due process is more reasonable to make a consensus of opinion than de facto standardisation. In general, formal standardisation is worked out by a rational and reliable process (i.e., due process). For example, the CAD framework initiative is a consortium established in 1988. The CAD framework initiative has made this method popular worldwide by being a good example of the success of working publicly on a mutual operation standard of design for computers and then developing it.

On the other hand, several de facto standards have been established by MNCs such as IBM and AT&T. However, as the life-cycle abridgment of technology increases, the cost burden for the company is increased. It is also quite unclear whether the whole industry follows and maintains such market-driven standardisation. MNCs, which proceed with de facto standards, are conscious of the increase to business risk. Therefore, a company tends to shift to formal standardisation from de facto standardisation, because the former is more likely to succeed in this setting. As mentioned, Takeda (2007) has demonstrated this trend in Japanese MNCs (Table 2). Corey (1997) clarifies that one purpose of an R&D consortium in those days was standardisation. Subsequently, he explains the winning standard strategy for a company's shift to formal standard setting from de facto standard setting. It also follows due process based on consensus building. In this way, the standard strategy is a method of innovation diffusion; however, the technology innovation does not become popular simply as a result of formal standard setting. Corey (1997) investigates six cases and their marketing activities (planning, promotion and distribution for users) point out important aspects of the diffusion of technology innovation.

Technology transfer and diffusion developed by a company or a consortium are achieved by independent actions of those organisations. Generally, technology is incorporated into products and services and then spreads to the market. In the market,

exchange of communication, which is the producer-to-user, buyer relationship, is established. Marketing is the communication exchange, which takes place in commerce and business. When attempting to investigate consortium activities to popularise technologies that are related to standardisation, it can be seen that standard diffusion is not promoted only by the standardisation and service activities of the consortium. In other words, a technology will not become popular only by being standardised by a consortium; rather, it must be marketed to users. According to Corey (1997), 'A broad conception of the consortium's role in technology diffusion that is, its role in marketing'. He points out that technology diffusion wrestles with the marketing activities of the consortium in technical development. This suggests that standardisation participates deeply in such activity. Examples illustrating this point (Ecma International and JAISA) will be introduced later in this paper.

4 Power sift: vertical to horizontal

In ICT, a rapid change in standardisation has occurred in recent years. This is related to the industry market structure change mentioned above. In addition, in ICT since 1980, the level of the industrial structure has changed. Vertical-regulation type markets of the huge influential vendors IBM, HP and DEC have changed into horizontal markets, where the vendor subdivides every element of hardware and software.

In marketing, business transaction flow use a metaphor of 'the flow of river': seller or provider is in upstream and buyer or user is in downstream. Relatively speaking, the power of upstream-situated vendors has declined, while the power of middle and downstream vendors has been strengthened. Accompanying this trend was a change in the pattern of the standardisation process. In other words, the standardisation process changed to a consortium type in which various vendors and users participate, taking the lead from consortium types in which giant vendors participate. Regarding this type of change in ICT, Gates (1999) claims that in the 1980s the structure of the computer industry was reorganised from the vertical-integration type, in which the vendor takes the lead, to a horizontal-integrated type, where the user takes the lead.

In addition, as he points out, since that time, 'a scale of economy' has been created by the intertwining of standardised software platforms with standardised hardware. This is indeed a big shift of the management paradigm in the business world.

5 The influence: marketing change

As described above, in the 1980s, the ICT industrial structure changed from a vertical-integration structure to a horizontal structure. At first, this change occurred mainly in the USA and spread throughout the world. The change in the ICT industrial structure then produced a competitive market. In the ICT industry, several companies joined the market and competition intensified. Accompanying this, business connections became mutual and exchange-relation-type business connections appeared between vendors and users.

From a closed market system, it changed to an open market and this had an influence on the business connections and marketing practices of vendors and users. Business

connections changed from a one-side supply operation formed by upstream vendors taking the lead into a demand form, which involved users downstream. In other words, business connections changed from a one-side supply type to an exchange type. Such a change in market transactions brought about a change in the characteristics of marketing as well. In other words, the marketing of the ICT industry was transformed from a vender taking the lead and ‘being one-sided’ form to a vender and user ‘both’ and ‘agreement’ form. This change in marketing occurred not only in the ICT industry but also spread to all manufacturing industries and initiated a revision of the definition of marketing.

AMA underwent a complete revision of its marketing definition in 1985. The old definition, established in 1965, was ‘all business activity which concerns property and the flow of services that is oriented from the producer to the last user by marketing’. The old marketing definition limits marketing mainly to ‘one-sided physical distribution by the producer’. The revised 1985 definition of marketing is that ‘marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual and organisational objectives’. The new definition goes beyond the material concept of ‘physical distribution’ and shifts to an ‘exchange’ of commercial dealings, bringing marketing once more into the context of a ‘relationship’.

The industrial market changed dramatically in the 1980s (Shimaguchi and Ishii, 1987). The base factors for this change are as follows:

- single product suppliers decreased and various kinds of product supplies increased
- the systematisation of high-tech products increased
- transaction costs declined as ICT advanced
- the life cycle of products became shorter.

This is important because it is related to the ICT reorganisation, which was previously shown by Gates (1999). These factors show that a competitive market appeared in the ICT field. Subsequently, we can see that a competing market appeared and took the lead and a dominant vendor market collapsed. A new competitive market, where several companies joined together, appeared. At the same time, several consortia were created.

6 Cases: Ecma International

Egyedi (2006) redefined aspects of the consortium problem. According to Egyedi (2006), standardisation setting is characterised as market competition rather than regulatory governance. In addition, the ultimate aim of standardisation by the consortium is compatibility, which implies the diffusion of technology innovation. This suggests that the consortium’s activities are market oriented. In this context, the case of Ecma International is interesting in terms of the domain change of the standardisation activities.

Ecma International is a consortium type 2 (specialised standardisation organisation), according to De Vreis’ (1999) definition. It is an industry association founded in 1961. Generally, the lifetime of a consortium is less than ten years; therefore, it is rare that Ecma International has existed for 46 years. Primarily, Ecma International started work on standards only in the field of computer or communication systems in Europe. Ecma aimed for standardisation in operational techniques such as programming input and

output codes to avoid duplication among computer manufacturers. The domain of Ecma standardisation in Europe was limited and narrow. In 1987, Ecma became a liaison member of ISO/IEC JTC1. Basically, Ecma is not a formal SDO but a private standard organisation. Its character is more market oriented than national formal standardisation bodies. Ecma has responsibility to submit fast track and PAS standardisation in the process of international formal standardisation when the member companies submit their own original market-oriented technologies, e.g., AIT, CD-ROM, C# Language Specification, Microsoft Office Open XML and Universal 3D File Format.

Since companies regard formal standardisation as important in the market, Ecma's role has expanded and become market-oriented. Now, several MNCs have joined to deal with formal standards setting for their own developed technologies. Ecma has a strong relation to ISO/IEC JTC1 and sometimes deals with standardisation projects with ISO/IEC. More than 70% of Ecma's standards have been adopted as international standards and/or technical reports. The membership is now open to companies not only in Europe but also in the rest of the world. In order to reflect these global activities, the organisation changed its name in 1994 from European Computer Manufacturers Association to Ecma International.

6.1 Standardisation case 1: near field communications interface and protocol-1 (NFCIP-1)

Near field communications (NFC) is a very short-range protocol, for distances measured in centimetres and is optimised for intuitive easy and secure communications between various devices without user configuration. In order to make two devices communication, users bring them close together or even make them touch. This will engage the NFC interface and protocol-1 (NFCIP-1) wireless devices' interfaces and configure them to form a peer-to-peer network. NFC can also bootstrap other protocols like Bluetooth or wireless Ethernet (WiFi) by exchanging the configuration and session data.

Initially Sony tried FeliCa (IC card) to be international standard in ISO/IEC JTC1 SC17. But Sony failed in their attempt because of France's opposition. In 2002, Sony joined Ecma's special task group to specify the NFCIP-1. Sony aimed for IS of FeliCa as NFC technology category. Sony and Philips offered proposal to Ecma. And Ecma adopted NFCIP-1 as ECMA-340 (Ecma Standard). In February 2003, Ecma submitted ECMA-340 to ISO/IEC JTC1 for adoption under their fast-track procedure as ISO/IEC 18092 international standards (IS). Finally Sony's FeliCa became IS in December 2003.

6.2 Standardisation case 2: C# programming language

In April 2003, ISO/IEC published international standard enabling the vendor-neutral programming of web services. International standard includes C#, an object-oriented programming language and the common language infrastructure (CLI) standards as well as CLI technical report. These publications were enabled by Ecma, which secured industry support and fast-track procedure. Microsoft developed specifications for each technology. These technologies are one of the most advanced runtime and development technologies available today. Many projects can build on these public standards to create a complete, open source.

Microsoft released C# in June 2000. In August, Microsoft, Intel and Hewlett-Packard co-submitted to Ecma by Microsoft, Intel and Hewlett-Packard. The cosponsors, together with other Ecma members including IBM, Fujitsu, Plum Hall and Monash University and expert guests, they refined these specifications for approval as Ecma standards. In December 2001, Ecma approved C# and CLI as ECMA-334 and ECMA-335, respectively. Ecma then submitted the standards to ISO/IEC JTC1 for fast-track procedure.

7 The trade association

A consortium is an aggregate of organisations such as companies, i.e., an organisation that is composed of elemental organisations. In addition, a consortium has the role of transmission by adjusting the interests and the purpose of its member organisations and functions on their behalf as the agency organisation. In the past, research was a minor activity in such organisations because a body independent of the company did the mainstream of organisational research. However, at present, the activity of consortia, NGOs, NPOs etc. has become remarkable and research within every agency organisation has become important. Staber (1982) makes such a trade association the subject of his research. He analyses the relationship of industrial-policy to theory with cases concerning trade associations in the USA. Until recently, there has been a failure in organisational sociology to recognise the historical character of organisations (Staber, 1982). However, it is not sufficient to show the historical characteristics of organisations as agencies. The focus of attention in this research is on the organisational properties or forms of trade associations.

In organisation theory, a company is supposed to use various mechanisms to cope with environmental constraint factors. These factors are internal growth, mergers, joint projects and trade associations. According to Staber (1982), a trade association is the cooperative form of industry organisations with the clear intent to take actions that deal with environmental variations. In addition, in engaging the concerned economic activity that is isomorphic or in a similar field, brings about the autonomy of the trade association.

Table 4 The characteristics of trade associations

<i>Characteristics</i>	<i>Contents</i>
Concept and framework	<ol style="list-style-type: none"> 1 Keeps boundary maintenance autonomy and sets boundaries concerning joining and leaving under the activity area of conduct organisation. 2 Points out a specific goal in the base agreement of members concerning resources and actions. 3 Distributes resources to the set of the features and the actions of the activity system organisation.

Source: Staber (1982), Chapter IV

Table 4 The characteristics of trade associations (continued)

<i>Characteristics</i>	<i>Contents</i>
Interest domain	<ol style="list-style-type: none"> 1 Degree of freedom of participation (member autonomy). 2 Control of subscriptions and quitting (organisation authority).
Internal organisation structure	Double structure: board organisation and chief executive organisation.
Membership fee	Decided by scale, proceeds of the participation company and so on.
Participation use right	<ol style="list-style-type: none"> 1 Bill voting rights for the members. 2 Members have a duty concerning offers and elucidation of business information. 3 Participation rights concerning specialties such as members of the work group. 4 Tendency that the influential big business members occupy important posts.
Activity	<ol style="list-style-type: none"> 1 Agency service for communication and business connections among the selected service members. 2 Dissemination of the costs of accounting standard manuals, calculating cost books, sorting-out and so on. 3 Advertisement and marketing by the establishment of a marketing trademark, symbol and so on. 4 Adjustment of industry rapport by the building of labour relations and negotiation with unions. 5 Forming of standards, standard of the product such as type, size, quality and so on. 6 Technical development and investigation about technology, studies and development of production and products. 7 Opportunity offers of industry information, mechanical training, education and information for members. 8 Public relations, which include social activities that represent the public relations industry. 9 Others

Source: Staber (1982), Chapter IV

A trade association is embedded in society and the economic environment. Organisation activities are a phenomenology process by which certain social relationships and actions come to be taken for granted. This concept is taken from the perspective of institutional theory. The trade associations as an agency have such characteristics for marketing, technology and R&D and have consortia featuring characteristics.

7.1 Case: JAISA

JAISA is a trade association as well as a consortium. It is consortium type 2 according to De Vries' (1999) definition (specialised standardisation organisation). With regard to technology diffusion, JAISA's combination of marketing and standardisation is unique. It is a private (open, membership-based) organisation founded in 1986. The aims of JAISA are to contribute to the diffusion of AIT, which includes barcodes, 2D symbology, RFID, biometrics, magnetic stripe, optical character recognition (OCR) and machine vision. The importance of AIDC is to contribute to the creation of our social infrastructure. JAISA's chairman, Mr. Tokuo Fujita states, 'AIT has contributed towards making our society safe and secure, JAISA is establishing its position in AIT in view of the importance of a social role'. This statement legitimates the social responsibility and value of JAISA as a trade association.

The importance of ubiquitous technology has been recognised and the market has been growing in Japan (about \$2,530 million in 2006). The AIT market consists of equipment (auto reader and printer), total systems, software and expendable supplies. Over 170 manufacturers and vendors belong to JAISA.

With respect to standardisation, the JAISA trend is to set international formal standards of ISO/IEC JTC. Occasionally, JAISA plays an important role as a fast-track and PAS submitter that is responsible for several AIT technologies such as interoperability, performance and assurance. In the past, the QR Code of 2D symbology (developed by Toyota Denso) became the IS and some supply chain application standards of RFID became IS, technical report and committee draft passed. In addition, after IS, popularisation (exhibitions and seminars in big cities, education for members, fostering and securing of AIT engineers by conducting a qualifying examination) is extremely effective for technology diffusion. The entire process from research to marketing as mentioned above is establishing the competitive position of JAISA as well as AIT in Japan.

This is a rare successful case for Japan. Generally, Japan is less competitive than Europe and the USA. Japan also lags behind on international standardisation competition.

8 Competition structure of standardisation

Figure 1 shows the competition predominant structure of standardisation.

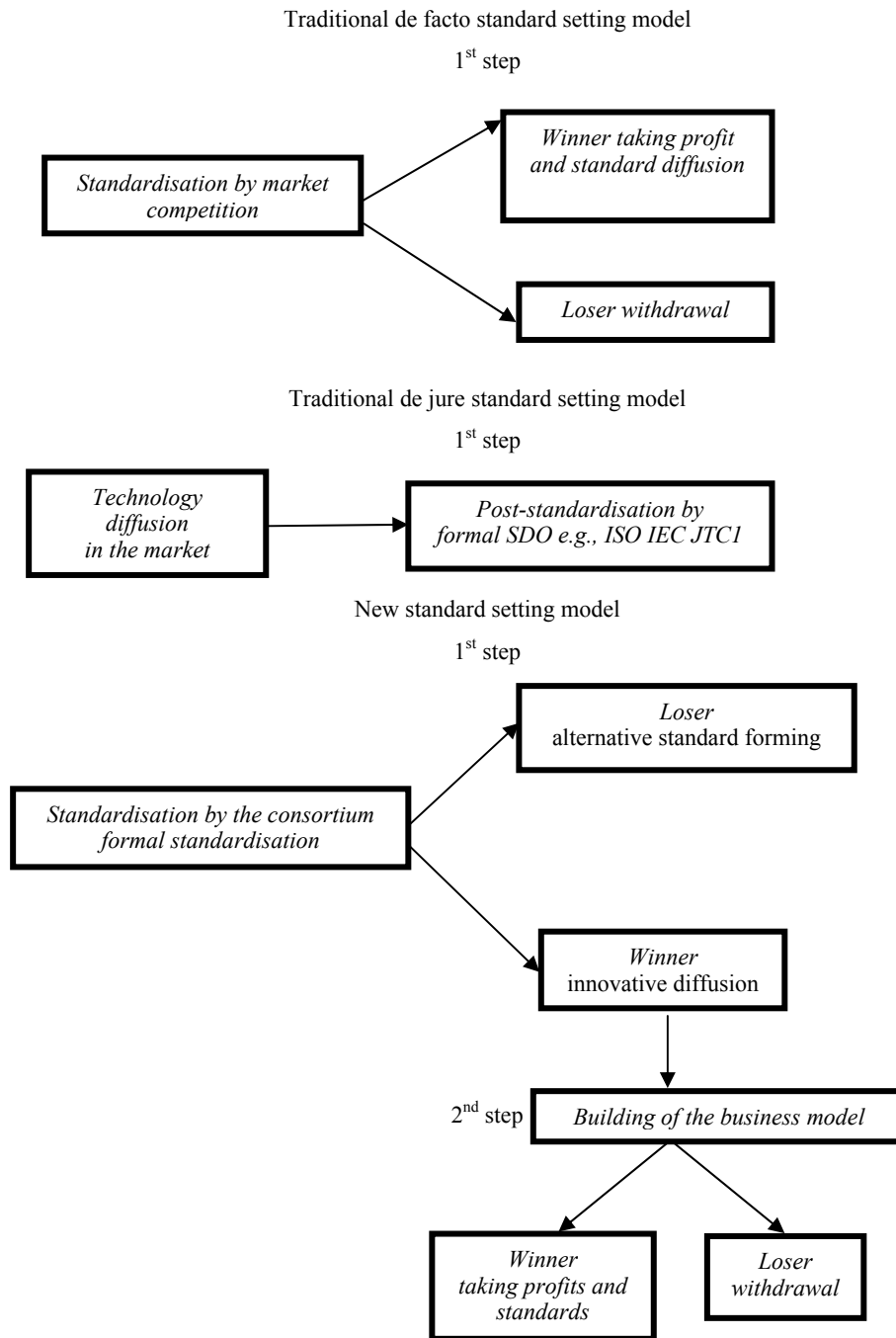
The methodology is based on the hearing survey of total 15 times to Japanese MNCs Denso, Hitachi, Fujitsu, SSO, ISO/IEC, JTC1 and AIT consortia JAISA, biometrics security consortium between 2005 and 2008. As mentioned, in the past years, exclusive de facto standard setting was the first priority for most MNCs, with each company acting on its own. However, formal standard setting has now become the mainstream. It is based on the alliance consortium where MNCs organise.

The reasons are:

- 1 the dominant companies disappeared from the market
- 2 to win the de facto standard competition it requires time and expenses
- 3 to avoid failure in setting the de facto standard the formal standard setting is more sure and reliable.

Figure 1 shows the change in the competition structure of standardisation brought about by such an industrial change. It was brought by the structural changes of the ICT market, as the author mentioned. The structure was reorganised from a vertical to a horizontal integration.

Figure 1 The competition predominant structure of standardisation



In the past, market competition was the only predominant factor in winning de facto standardisation for a company. This is a single stage structure (one step). Also, traditional de jure standardisation is single stage. This standardisation is post standardisation. The standard setting is after the diffusion of technologies in the market. However, a company can now win competition predominance with formal standard setting. Of these examples, the former models are shown by a single-stage structure; however, the latter model becomes a double-stage structure (two steps) and standardisation competition takes on a complicated aspect.

For the company, it is more important to profit from ‘the standard setting’ than ‘setting standard (first step)’. It means that ‘after setting the standard (second step)’, a strategy is essential. The first step is to establish a market platform, which is a base of the market. In the second step, establishment of a company’s own business model leads to market competitiveness.

Also, for the company, it is more important to profit from ‘the standard setting’ than ‘setting standard (first step)’. It means that ‘after setting the standard (second step)’, a strategy is essential. The first step is to establish a market platform, which is a base of the market. In the second step, establishment of a company’s own business model leads to market competitiveness.

9 Conclusions

This article shows that it is possible to understand the details and background of consortia and standardisation. The consortium originated in R&D according to the literature research. The function and the role were diversified at later years as the establishment of the consortium increased. In such and standardisation became one of the important functions of the consortium, too. The consortium is an alliance between stakeholders and it has the side as the trade association and PAS submitter at time. Moreover, the consortium mainly consists of the MNCs and is intending formal standardisation.

The reasons are as follows.

- 1 the dominant companies disappeared from the market
- 2 to win the de facto standard competition it requires time and expenses
- 3 to avoid failure in setting the de facto standard the consensus-based formal standard setting is more reliable.

The activity of the consortium is now over many topics. All topics are necessary to diffuse standards (i.e., a kind of technological innovation) and keep a long life of the consortium. In Ecma International case, in the early stage, the standardisation task was limited to the computer field in Europe, but this consortium became a great fast track and PAS submit organisation in worldwide ICT field afterwards. And Ecma International is now maintaining long life over 45 years. Moreover, in JAISA case, the AIT technology diffusion is assumed to be the greatest mission of this consortium as a trade association. Standardisation and the extended activity whole (i.e., marketing) are assumed to be a strategy to survive as a vital consortium. To participate the consortium, to set formal standards and to spread them to the market and to establish a technological base (i.e., platform), MNCs are intending it. And MNCs try to construct an original business model

on the base and to obtain earnings. Such a structure shows the current state of the international business competition.

In this thesis, the examination with the literature base and the macro statistics base was centres. It is necessary to take up a lot of feature consortia in the research in the future and to investigate an individual case in details.

References

- Cargill, C.F. (1997) *Open Systems Standardization*, Prentice Hall, New Jersey.
- Corey, E.R. (1997) *Technology Fountainheads the Management Challenge of R&D Consortia*, Harvard Business School Press, Boston.
- De Vries, H.J. (1999) *Standardization*, Academic Publishers, Dordrecht, The Netherlands, Kluwer.
- Egyedi, T.M. (2006) 'Beyond consortia, beyond standardization, redefining the consortium problem', in Jakobs, K. (Ed.): *Information Technology Standards and Standardization Research*, pp.91–109, Idea Group Publishing, London.
- Ferrel, J. and Saloner, G. (1988) 'Coordination through committees and markets', *RAND Journal of Economics*, Vol. 19, pp.235–252.
- Gates, W.H. (1999) *Business @ The Speed of Thought*, Warner Books, Clayton.
- Gibson, D.V. and Rogers, E.M. (1994) *R&D Collaboration on Trial*, Harvard Business School Press, Boston.
- Hallström, K.T. (2004) *Organizing International Standardization*, Edward Elgar, Cheltenham.
- Hawkins, R. (1999) 'The rise of consortia in the information and communication technology industries emerging implications for policy', *Telecommunications Policy*, Vol. 23, pp.159–173.
- Porter, M.E. (1985) *Competitive Advantage*, Free Press, New York.
- Schmidt, S.K. and Werle, R. (1998) *Coordinating Technology*, MIT Press, Cambridge, MA.
- Shimaguchi, M. and Ishii, J. (1987) *Contemporary Marketing*, Yuhikaku, Tokyo.
- Spivak, S.M. and Brenner, F.C. (2001) *Standardization Essentials*, Marcel Dekker, London.
- Staber, U.H. (1982) 'The organizational properties of trade associations (thesis or dissertation style)', PhD dissertation, Faculty of the Graduate School of Cornell University, Michigan, U MI.
- Sullivan, C.D. (1983) *Standards and Standardization*, Marcel Dekker, London.
- Takeda, S. (2007) 'The trend of world MNCs' integration and reorganisation', *Journal of Economic Policy for Quality Life*, No. 129, p.7.
- Telecommunication Technology Committee (2006) *The Investigation Report about Forum Activities of ICT*, 12th ed., (Annual book style, Japanese), Telecommunication Technology Committee, Tokyo.
- Uchida, Y. (2001) 'De fact standard', in Takeda, S., Uchida, Y. and Kajjura, M. (Eds.): *International Standards and Strategic Alliance* (Japanese), Chuo-Keizai Sha, Tokyo.
- Updegrove, A. (1995) 'Consortia and the role of the government in standard setting', in Kahin, B. and Abbate, J. (Eds.): *Standards Policy for Information Infrastructure*, pp.321–348, MIT Press, Cambridge, MA.
- Warner, A.G. (2006) 'Block alliances and the formation of standards', in K. Jakobs (Eds.): *Information Technology Standards and Standardization Research*, pp.50–70, Idea Group Publishing, London.
- Weiss, M. and Cargill, C. (1992) 'Consortia in the standards development process', *Journal of the American Society for Information Science*, Vol. 43, No. 8, pp.559–565.

Yamada, H. (1997) *Competitive Strategies for De fact Standard* (Japanese), Nihon-Keizai Sinbun Sha, Tokyo.