

# A Study on the Progress of e-Trade and the Factor of the Adoption of bolero.net in Japan

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## Abstract

In recent years, although far behind, the "e-Trade (B to G)" is propelled vigorously in Japan. But the diffusion of the "e-Trade" among companies (B to B) represented by bolero.net does not meet expectation. This paper carried out the questionnaire survey to the enterprises, which adopt bolero.net and examined why the diffusion is stagnated to the measures for its future spread.

As a result, the top 3 adoption factors are: (1) Transaction climate, (2) Top management support, and (3) Operational improvement. In other words, it depends that top management has the will, which adopts e-trade positively among the reliable business partners and the operational performances can improve efficiently by carrying e-trade.

We would like to clarify what will be crucial to spur the diffusion in the future. Based on the findings from the result, the concrete key points to promote the spread are to be indicated as follows: ① Improve the scores of "Cost" and "Competitive pressure" ② Improve the institutional factor.

Key Words: e-Trade in Japan, Factor of the Adoption of bolero net, Cost and Competitive Pressure, Transaction Climate, Top Management Support, Operational Improvement

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## I. Introduction

Presently, many countries are promoting vigorously “e-Trade (B to G)”. For example, the U.S. made ACE (Automated Commercial Environments) project, which is the custom modernization initiative including customhouse electronic processing, start from February 2003. Also, EU announced a simple and paperless environment for Customs and Trade, which is a custom extensive electronic processing plan in July 2003. Moreover, Japan determined the cooperation of the existing system of the government and private sector and reexamination of the entire system in e-Japan strategy II in July 2003.

Although “e-Trade (B to B)” in the private sector represented by bolero.net increases the number of the participants gradually, it does not grow as rapidly as expected. Then, why has the spread of such platform businesses been restrained? Concerning this point, when considering the trend of future merchandise trade, it is very important in spite, sufficient empirical examination was not performed. Under such circumstances, Naganuma targeting bolero.net, which is typical case of platform business, analyzes the adoption factors of the participating enterprises.

In this presentation, the cause of sluggish penetration of “e-Trade” will be explained with the findings from Naganuma.<sup>1)</sup> In addition, the measures needed to accelerate the future diffusion of it will be discussed along with the trend of “e-Trade” in recent years.

## II. Present state of “e-Trade” in Japan

Of late years, the concrete and epoch making movement regarding “e-Trade (B to G)” has activated in Japan. For example, NACCS center<sup>2)</sup> affiliated with Ministry of Finance released “Sea NACCS — EDI specification for private inter system connection,” and illustrated the connection with the other systems. In relation to this, the Port Logistic Information System Association (POLISA), which manages POLINET,<sup>3)</sup> has announced the interconnection plan with NACCS in March 2004.

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1) Ken Naganuma, “A Study on the Factor of the adoption of E-commerce in the international trade -a case study on bolero.net-,” *JAFTAB*, No.41, 2004, pp.81-89.

2) NACCS center is managing Sea NACCS which electrizes custom procedure such as the import and export custom clearance service on cargos by sea.

3) POLINET is the network where the harbor logistics information in importing and exporting is electrized.

The diffusion of “e-Trade” in the private sector (B to B) represented by bolero.net does not show growth to the extent that it had been expected. The number of Japanese enterprise, which has participated in bolero.net, is increased gradually, but it is 34 corporations as of April 2003.

### III. Hypothesis and Methodology

#### 1. Investigation model and hypothesis

Naganuma investigated the primary factors, which have the effect on adoption of the “e-Trade” with the investigation model (see Figure 2) on the basis of the key concepts shown in Figure 1. Here, especially important factors are to be explained.

<Figure 1> Key concepts for the investigation

Category	NO.	Factor of adoption	Researchers
Inner-organization Characteristics	1	Operating improvement	Premukumar & Ramamurthy(1995)
	2	Top mnt support	Premukumar & Ramamurthy(1995) Premukumar et al(1997)
	3	Size	Banerjee et al.(1992) daugherty(1995) Premukumar & Ramamurthy(1995) Premukumar et al(1997)
Innovation Characteristics	4	Relative advantage	Rogers(1995) Mahler&Rogers(1999)
	5	Compatibility	Rogers(1995) Mahler&Rogers(1999)
	6	Complexity	Rogers(1995) Mahler&Rogers(1999)
	7	Cost	Rogers(1995) Mahler&Rogers(1999)
Inter-organization Characteristics (Environmental Characteristics 1)	8	Competitive advantage	Porter(1980, 1985) Cash et al. (1985) Clemens & Row(1988) Johnston & Vitale(1988)
	9	Competitive pressure	Iacovou et al.(1995) Premukumar & Ramamurthy(1995) Premukumar et al (1997) Ramamurthy et al(1999) Reekers et al.(1994) Riggins et al.
	10	Dependency	Mukhopadhyay et al. (1995) Webster (1995) Reekers&Smithson(1996) Premukumar et al. (1997)
	11	Transaction climate	Premukumar & Ramamurthy(1995) Premukumar et al(1997) Ratnasiam (2001)
	12	External support	O'Callaghan(1992) Premukumar et al. (1997) Ramamurthy et al(1999)
	13	Critical Mass	Rogers(1995) Valente(1995)
Institution Characteristics (Environmental Characteristics 2)	14	Law	Naganuma(2004)
	15	National policy	Naganuma(2004)
	16	Custom	Naganuma(2004)

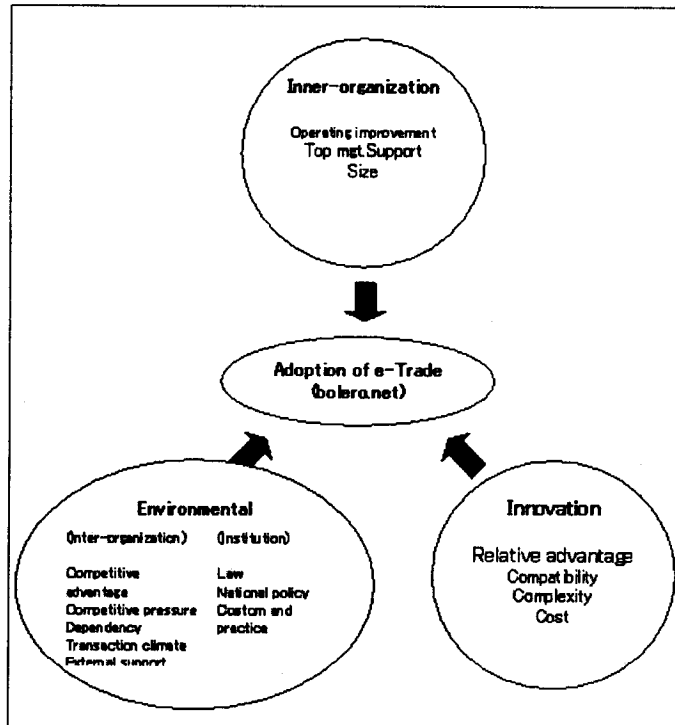
#### 1) Operating improvement (Improvement of operating performance)

The merchandise trade business using paper documents is pointed out to be inefficient.<sup>4)</sup> Also, such business causes the problem of the “crisis of the bill of lading” as its negative by product.<sup>5)</sup> The “e-Trade”

4) Satoshi Niibori, “Electronic Bill of Lading,” *Journal of the Japanese Institute of International Business Law*, Vol.19, No.8, 1991, pp.1007-1008; Satoshi Niibori, *Bouekitorihiki no Riron to Jisse*, Sanmine Shobo, 1993, pp.153-218.

was originally suggested in order to solve such a problem and the “improvement of operating performance” could influence on the decision of adoption by a company.

<Figure 2> Investigation model



## 2) Top management support

The importance of “top management support” is already indicated empirically.<sup>6)</sup> The “top management support” has been recognized to be important when you execute IS (Information System), but it becomes critical in the inter-organization system which needs cooperation with your transaction partner such as EDI - IOS.

## 3) Relative Advantage

5) Satoshi Niibori, “Sea Waybil,” *Journal of the Japanese Institute of International Business Law*, Vol.19, No.4, 1991, p.462.

6) K. Ramamurthy, G. Premkuma and M. Crum, “Organizational and Interorganizational Determinants of EDI Diffusion and Organizational Performance : a Causal Model,” *Journal of Organizational Computing and Electronic Commerce*, Vol.9, No.4, 1999, pp.253-285.

The “relative predominance” is not sufficiently recognized except that the innovation is superior to the present products and existing processes.<sup>7)</sup> The “e-Trade” is considered to be superior to the former paper based business in swiftness, cost performance, and accuracy.<sup>8)</sup>

#### 4) Competitive pressure

Generally, competition among enterprises is strongly influenced by innovational adoption. The “competitive pressure” refers to the pressure of EDI utilization in accordance with the request from the business partner, the one from the industry introducing EDI as standardized purchase activities, and the one of losing competitive predominance by the lack of EDI linkage with the business partners etc.<sup>9)</sup> Many researchers have reported this “competitive pressure” to be a crucial determinant factor in adoption and execution of EDI · IOS.<sup>10)</sup>

#### 5) Transaction climate

While the dependency of transaction is the compulsory adoption by the business partners, it is reported that the “climate”<sup>11)</sup> in the dealings which both enterprises have built over years does influence on the adoption of EDI · IOS. In addition, Ratnasingam<sup>12)</sup> has reported that reliance with business partners is especially important in order to construct the prolonged business connections with EDI.

#### 6) Critical mass

The critical mass is defined as the fraction of the adoption measured at the level of the system, which is required in order that the adoption rate of two interactive innovation<sup>13)</sup> becomes sustainable. The word

7) E. M. Rogers, *Diffusion of Innovations*, Free Press, New York, 1995, pp.315-320.

8) Ken Naganuma and Satoshi Niibori, “The Electronic Commerce in the International Trade : Present and Future,” *Information Science Studies*, No.9, 2000, pp.53-54.; Akira Yao, *Boueki Kinyuu no Densitorihiki*, Toukyoukeizaijyouhou Shuppan, 2001, p.3.; Hiroshi Kimura, “Legal Aspect of Electronic B/L(1),” *KAIUN*, No.875, 2000, pp.66-69.; Jun Mamiya, “Bouekitorihiki no Denshika no Jittai,” *Jurist*, No.1183, 2000, pp.130-135.

9) G. Premkumar and K. Ramamurthy, “The Role of Interorganizational and Organizational Factors on the Decision Mode for Adoption of Interorganizational Systems,” *Decision Sciences*, Vol.26, No.3, 1995, p.311.

10) N. Reekers and S. Smithson, “EDI in Germany and the UK: Strategic and Operational Use,” *European Journal of Information Systems*, Vol.3, No.3, 1994, pp.169-178.

11) Williamson does not define the concept of “climate” clearly, it can be thought as what is related to the reliance among enterprises. See Sasaki Hiroshi, *B to B Gata Soshikikankaneki to IT Management*, Doubunkan Shuppan, 2001, p.35.

12) P. Ratnasingam, “Inter-organizational Trust in EDI Adoption: the Case of Ford Motor Company and PBR Limited in Australia,” *Internet Research: Electronic Networking Applications and Policy*, Vol.11, No.3, 2001, pp.261-269.

13) The interactive means the extent to which the participant in the communication system exchanges each role in mutual conversation and controls the conversation. See Everett M. Rogers, *India's Communication Revolution*, SAGE Publications, New Delhi. Rohlf, 2001, p.31.

originates in the nuclear physics, where it is defined as the quantity of the radioactive substance necessary for the atomic reactor to reach the critical point through continuous reactions.<sup>14)</sup> According to the preceding research, it is argued that existence of the critical mass becomes important in the spread of two directional innovation<sup>15)</sup>.

## 2. Questionnaire items and outcomes

We carried out a questionnaire survey so as to reveal the primary adoption factor of “e-Trade”. The target company is 25 companies, which have participated in bolero.net. The feature of the objectives is shown in Table 1.

<Table 1> Feature of target enterprises

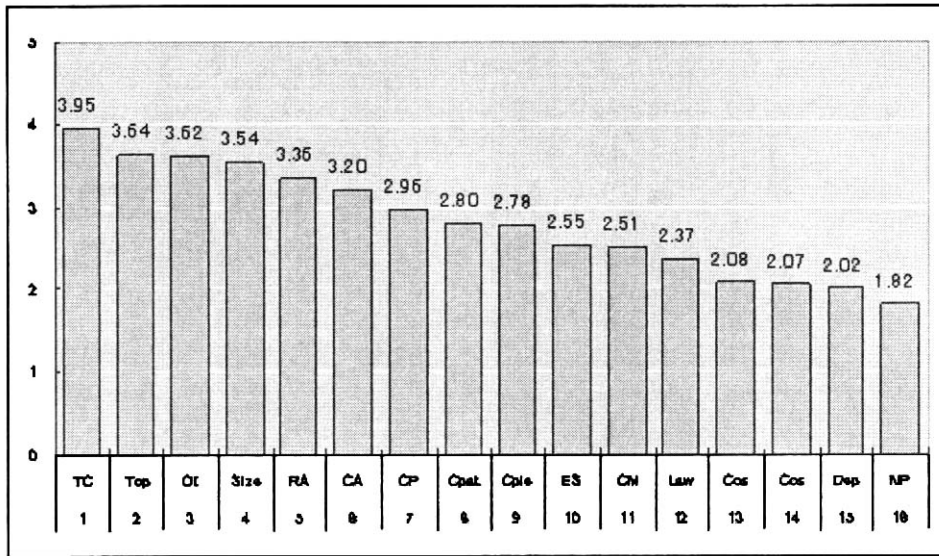
	Number of firms	Percentage
<b>Industry</b>		
Manufacturing	4	16
Wholesale and retail	5	20
Bank	6	24
Transportation	10	40
<b>Company size</b>		
More than 5000 employees	10	40
1001~5000 employees	6	24
501~1000 employees	2	8
101~500 employees	4	16
less than 100 employees	3	12
<b>Capital</b>		
More than ¥101 billion	9	36
¥50.1~¥100 billion	4	16
¥10.1~¥50 billion	4	16
¥1.1~¥10 billion	6	24
less than ¥1 billion	2	8

First, Figure 3 lists the mean values of the primary factors affecting whether the companies introduce the “e-Trade.”

14) E. M. Rogers, op.cit., p.318.

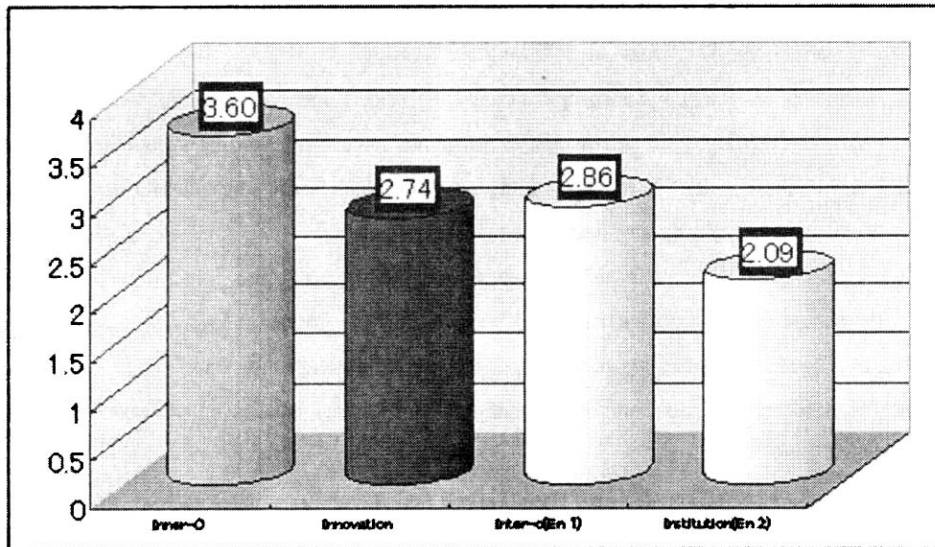
15) Especially in diffusion of the bidirectional innovation, stronger critical mass is shown. Alwin Mahler & Everett M. Rogers, “The diffusion of interactive communication innovations and the critical mass,” *Telecommunications Policy*, Vol.23, 1999, pp.719-740.

<Figure 3> Ranking of mean value of primary adoption factors



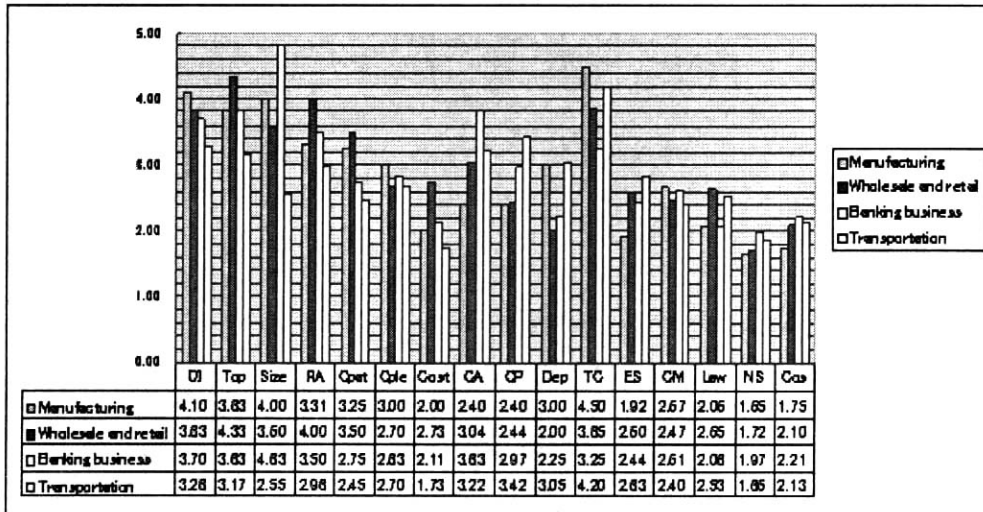
Second, the primary factors are classified into 4 categories and those averages are compared.

<Figure 4> Mean values of the primary adoption factors categorized into 4



Furthermore, those mean values of the primary factors are arranged into 4 industries.

<Figure 5> Mean values of the primary adoption factors by industries.



## IV. Results of Analysis

### 1. The interpretation for the results

From Figure 3 and 4, the key points are following six below.

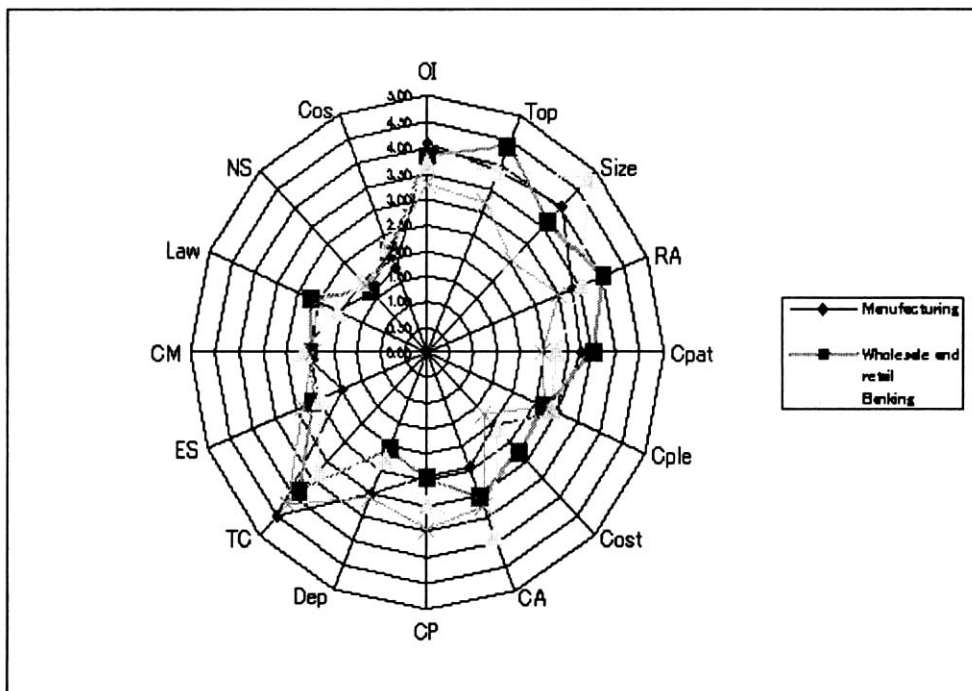
- Point 1. The adoption enterprises recognize that the “e-Trade” improves operating performance and is efficient (exact and swift information exchange) in comparison with document-based business.
- Point 2. The enterprises, which have long term and confidential business relationship, are launching the adoption under mutual agreement.
- Point 3. Since the diffusion is in initial stage and there are not many participating companies, the competitive pressure from industry and from the business partner is low.
- Point 4. The adoption enterprises are not satisfied with the fee setting of “e-Trade”.
- Point 5. The adoption enterprises are not content with the national policies or correspondence regarding “the e-Trade”.
- Point 6. As the primary adoption factors are classified into 4 categories and compared, the organizational factors score the highest points. According to preceding researches, the inter-organizational factor mark the highest score in successful EDI · IOS.



Moreover, from Figure 5, the entire mean value in each industry is 2.97 in the wholesale and retail industry, 2.95 in the banking business, 2.87 in the manufacturing industry, and 2.78 in the transportation business. Next, the feature of the respective industry.

As for entire mean value classified by industry, the wholesale retail industry 2.97, the banking business 2.95, the manufacturing industry 2.87, the carrying trade has become with 2.78. Next, the feature of the respective industry is summarized using Figure 6.

<Figure 6> Radar chart of primary adoption factors by industry type



### 1) Manufacturing industry

The two features of the manufacturing industry are as follows.

- i) The large scale manufacturer is advancing the “e-Trade” with the business partners with a trusting relationship for the purpose of improvement of operating performance.
- ii) On the other hand, “e-Trade” still has not become a general information system. Moreover, the manufacturer is not satisfied with the support from the industry or the vendor or with the national policy for the “e-Trade.”

Furthermore, it is of particular importance that Compatibility (rank 6th 3.25) was high enough above our anticipation. It is attributable to the situation that the manufacturer, which decided its adoption would try to build the information system, related to the “e-Trade” or would be at the time to switch to the system.

## 2) Wholesale and retail industry

The features of the wholesale and retail industry are two points below.

- i) The enterprises of the wholesale and retail industry that recognize that the “e-Trade” is superior to the document based business are promoting the “e-Trade” along with reliable business partners by positive decision of top management.
- ii) On the other hand, the transaction business utilizing the “e-Trade” has not served as major one. Also, enterprises in the wholesale and retail industry are not forced to determine the adoption from other companies. In addition, the enterprises in this industry, just as in other industries, are not content with the national policy for the “e-Trade.”

## 3) Banking business

The two main features of the banking business are shown below.

- i) The large scale bank and insurance company have adopted the “e-Trade” by active judgment of top management in order to acquire competitive advantage.
- ii) On the other side of the coin, the bank and insurance company feel dissatisfaction about the consolidation of the legal system and the national policy for the “e-Trade.”

## 4) Transportation business

The features of the carrying trade are two shown below.

- i) The transportation company which is trying to improve its operating performance is promoting the “e-Trade” together with the trusted firms in the face of the pressure from the industry and business partners.
- ii) Meanwhile, the transaction employing the “e-Trade” has not become standard. Moreover, the transportation company is not satisfied with the national policy for the “e-Trade” or with its

operational and maintenance costs.

Especially with expense, does this industry feel discontent among all industries.

## 2. Implications to promote the diffusion

Now, we would like to clarify what will be crucial to spur the diffusion in the future. Based on the findings from Naganuma (2004), the concrete key points to promote the spread are to be indicated as follows:

### 1) Improve the score of “expense” and “competitive pressure”

According to preceding studies, “competitive pressure” is very important factor for the adoption in successful EDI · IOS case. In this research, however, the score of it was not so high (rank 7, 2.96). In addition, “Cost” ranks 14th within all 16 factors and the expenses for the “e-Trade” (expense for introduction, operational cost, and maintenance cost) are considered to be costly in almost all the industries.

Then, taking into account the property that the bigger the network of “e-Trade” becomes, the more the benefit from it increases (equivalently, the benefit from it is smaller when the network is smaller) (Naganuma, 2002), it is necessary that the fee setting which corresponds to the cost performance should be done for an early participation enterprise so as to incorporate more early participants into the network. The increase of adoption companies improves operational benefit and makes the network more attractive. Consequently, “competitive pressure” will increase and the possibility of achieving critical mass will rise.

### 2) Improve the institutional factor.

The institutional factors (improvements to the legal system (Law), National support, and Custom) resulted in very low points in this questionnaire survey when seen as a whole and even by industrial type. In order to renovate this, it is necessary first to advance the improvements of the legal system further where companies can do business safely. It is also needed to realize the connection and interchangeability with the public organization (for instance, NACCS and JETRAS), to expand its applicable scope, and to make it more convenient. Furthermore, the government should provide concrete benefits (mitigation of fees and taxes) for the companies that promote the “e-Trade” actively.

## V. Conclusion and future prospects

In recent years, although far behind, the “e-Trade (B to G)” is propelled vigorously in Japan. The diffusion of the “e-Trade” among companies (B to B) represented by bolero.net does not grow at the expected speed. We carried out the questionnaire survey to the adoption enterprises of bolero.net to explore the primary adoption factors of the “e-Trade” and examined why the diffusion of it is stagnated to argue the measures for its future spread. As a result, the top 3 adoption factors are: (1) Transaction climate, (2) Top management support, and (3) Operational improvement. In other words, it is verified that the enterprise adopting the “e-Trade” were attracted by the improvement of operational performance and their top managements determined to adopt it positively along with reliable business partners.

According to the preceding researches, the primary adoption factor of successful EDI · IOS is “competitive pressure”. In this research, however, the score of it was not so high (rank 7, 2.96). This implies that the pressure from the industry and business partners is not placed so much in many industries in the case of introducing it (the only exception is the transportation industry where the average score of the competitive pressure is 3.42 ranking 2). On the other hand, the worst 3 adoption factors are: (14) Cost, (15) Dependency, and (16) National policy. This means that the adoption companies are not satisfied with the fee settings on the “e-Trade” or with the national policy and that there was not strong pressure from business partners in the adoption determination. From these results of this study, the following two points are necessary to spur the diffusion of the “e-Trade”:

- ① Improve the scores of “Cost” and “Competitive pressure”
- ② Improve the institutional factor

First, as for the “expense” and “Competitive pressure”, bolero.net has introduced web trade EDI service to achieve a lower price and improvement of its convenience. This service is priced at 100,000 yen for contract charge and at 45000 yen for monthly charge. In addition to such reductions in operational charges and maintenance costs, the switching costs, if also taken into account, will promote its adoption further. Moreover, Nittsu, the Japanese logistics company, announced the supply of “N-Expect” service (the trade settlement service using the system of bolero.net). The fact that that top line logistics company launched such service will advance the adoption of it mainly among its business partners. If adoption by enterprises develops like this case and its diffusion rate exceed the critical mass, adoption enterprises furthermore will increase, the “competitive pressure” will strengthen, and the “e-Trade” will achieve sustainable growth.

Next, as for the “institutional factor,” bolero.net has announced the fundamental agreement of cooperating and connecting with NACCS<sup>16)</sup> and is conducting an empirical experiment now premised on the mutual cooperation with POLINET. This will have a great impact on the enterprises; because it will yield a great effect on efficiency and convenience that a common standardized format is used among enterprises (B to B) and/or between an enterprise and the government (B to G), where those players are connected seamlessly. This point is attractive for the companies, which build up their own information system among affiliated companies or in a business group and, in the future, will become additional information in considering the participation.

Furthermore, an electrization initiative which APEC promotes with neighboring countries in Asia and ACE (Automated Commercial Environments) project, which is custom modernization initiative including electronic processing of custom in the U.S., will give big influence and pressure to development of the “e-Trade” in Japan like Arrival of the Black Ships. Under such circumstances, the “e-Trade” will spread further from now on.

We would try to look carefully at the influence of the “e-Trade” on industrial structure and interorganizational relationship to confirm the validity of this research — it does develop and deepen our research theme.

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16) Now, bolero.net and NACCS are working on the final details of the technical aspects in order to move to electrization.

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