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MEDIA CHOICE IN INTERORGANIZATIONAL TRANSACTIONS: 
AN EXPLORATORY STUDY OF THE DISTRIBUTION OF DRY GROCERIES IN JAPAN

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Abstract

This paper identifies factors that contribute to the choice of media used for interorganizational communication. We develop the framework that media choice between firms is determined by the fit between characteristics of the media and (1) the attributes of information flows and (2) the quantities and composition of the firms’ assets. Based on this framework, we conducted an exploratory research on the choice of media that firms use to place orders in dry grocery distribution in Japan. We found five factors in media choice: (1) the design of physical distribution, (2) the share of transactions of a business partner, (3) the firm’s solvency for media costs, (4) the installed base of facilities, and (5) mutual complementarity among media.

1. INTRODUCTION

In interorganizational transactions, various media, such as telephone, facsimile, face-to-face, mail, e-mail, floppy disk, magnetic tape, and electronic data exchange (EDI), are used for a number of communication needs regarding negotiations, coordination, order placement, physical distribution, payment, etc.

We observed significant differences in media choice among corporations, industries, or channels. In the Japanese distribution of dry groceries, for example, although EDI is widely used for order placements between wholesalers and retailers, the telephone and facsimile are the primary means used between manufacturers and wholesalers. Similarly, while EDI is widely used between manufacturers and wholesalers in the distribution of toiletries, we see a much smaller adoption rate in the same segment of dry grocery distribution. In our research, we tried to identify factors that contribute to these differences.

Media choice is a very important management decision for interorganizational transactions for three reasons. First, a medium puts restrictions on not only information flows between organizations but also transaction processes, physical distribution, and payments, which are closely related to information flows. Second, media choice represents a large investment decision for organizations because the adoption of a medium forces firms to purchase and customize facilities, develop software or manuals, train operators, and change business procedures. Third, media prompts the accumulation of information, such as knowledge and databases, as well as the network of human relations between firms.

In our research, we employed a framework that media choice between firms is determined by (1) the attributes of information flows and (2) the managerial assets of the firm. Based on this framework, we conducted an exploratory study regarding media choice among firms. We focused on the media that firms use to place orders in dry grocery distribution.

Based on the research, we identified five factors in media choice:

• the design of physical distribution,
• the share of transactions with a partner,
• the firm’s solvency for media costs,
• the installed base of facilities,
• mutual complementarity among media.

2. THEORETICAL BACKGROUNDS

The body of literature regarding intraorganizational media choice is larger than that regarding interorganizational media choice. Thus, we start by reviewing recent developments regarding media choice within organizations and then we discuss interorganizational media choice.
2.1 Media Choice Within Organizations

Galbraith (1973) identified uncertainty as the primary reason why communication takes place in organizations. The information richness theory of Daft and Lengel (1986), a representative theory of media choice within organizations which is built upon Galbraith’s theory, points to uncertainty and equivocality as the factors that create the need for information processing. They also insist that the degree of uncertainty and equivocality determines the media choice. According to the theory, “rich media,” i.e., media that are better at reducing uncertainty and equivocality, are chosen when there is a high degree of uncertainty and/or equivocality. In general, oral media are believed richer than written media, and synchronous media are believed richer than asynchronous media (Markus 1994).

In the information richness theory, the factors determining the media choice means are the (perceived) characteristics of media by individuals. The theories of adoption of new communication technology, which build on the diffusion theories of technology, on the other hand, attribute them to socially perceived characteristics of media within organizations.

Rogers (1983) raised five attributes of innovation: relative advantage, compatibility, complexity, trialability and observability. These attributes can be regarded as socially perceived characteristics of new products, including media. Furthermore, Rogers (1986) pointed out that media have three idiosyncratic characteristics in the process of diffusion. First, adoption of a medium should be defined as the social decision to make full use of it, rather than the decision to adopt or implementation. Second, media often require re-invention, i.e., modification by users in the process of adoption. Third, a critical mass of adopters of a medium is necessary before it becomes sufficiently useful for an individual to adopt.

The critical mass theory (Markus 1987) makes much of network externalities, i.e., how many people use the medium within the organization. According to Markus’s (1994) view, the information richness theory can predict media choice when the medium is already universally used in the organization. In the case of new media, the critical mass theory is more suitable than the information richness theory.

2.2 Media Choice in Interorganizational Transactions

Regarding media choice in interorganizational transactions, Bouchard (1993) supported the critical mass theory and dismissed the hypothesis that attributes of innovation (Rogers 1983) determine media choice based on a field study of usage of EDI among suppliers of the retail industry. The conclusion of the research is that the decisions of organizations are based on what their major business partners are doing, not on the characteristics of EDI.

Don’t (perceived) characteristics of media matter in media choice? We basically support the critical mass theory, but the theory seems insufficient in explaining some phenomena. Even if suppliers obey what their customers choose, how do the customers choose the media? What explains the differences in media choice that we observe between industries or between the upstream and downstream of channels?

With respect to interorganizational transactions, a similar point of view of the information richness theory may be needed. That is, media are chosen by the fit between the characteristics of media and determinants.

The characteristics of media have two aspects. The first aspect is the ability of information processing. Among characteristics related to abilities of information processing, the information richness theory focuses on “richness.” It might be necessary to break down “richness” into concrete attributes, such as speed, capacity, accuracy, interactivity, etc., at the level of interorganizational transaction. Media choice is determined by the fit between these media characteristics and the required ability of information processing. For example, when the speed of information flows has the first priority, the medium that transmits information the fastest might be selected.

The second aspect of media characteristics is cost. Media choice is actually determined by a tradeoff between the required ability of information processing and the costs that media increase/reduce. As these costs can be regarded as transaction costs, media have a potential to vary transactional relations between firms through transaction costs (Coase 1937; Williamson 1975, 1985; Clemons and Row 1992; Clemons, Reddi and Row 1993; Malone, Yates and Benjamin 1987; Gurbaxani and Whang 1991).

Among transaction costs, transmission costs, set-up costs (i.e., costs to initiate a session of communication with a partner [Kokuryo 1992]), and coding/decoding costs affect media choice by varying coordination costs among firms. The fixed costs for the installation and transaction-specificity of media also affect media choice by changing risks that are caused by transaction-specificity (Williamson 1985; Clemons and Row 1992; Clemons, Reddi and Row 1993). For example, sunk costs of old media sometimes interrupt the switch to new media and partners (McFarlan 1984).

3. RESEARCH DESIGN

To identify what factors contribute to media choice, we conducted an exploratory study because the body of literature regarding media choice between firms is small. In this section, we will
Table 1. Respondents of Interviews

<table>
<thead>
<tr>
<th></th>
<th>Dry Groceries</th>
<th>Toiletries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maker</td>
<td>Wholesaler</td>
</tr>
<tr>
<td>Number of Firms</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Number of Respondents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Systems</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Logistics</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Buyer/Sales</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

explain the methodology then try a rough modeling of media choice for the exploratory research.

3.1 Research Methods

The objectives of the research that we conducted were to identify the factors in media choice between firms. We aimed at discovering the variables and the relationships between the variables through an exploratory field research.

We selected media choice for order placements on logistic systems of dry groceries as our field. Prior to the research, we identified the following facts in the industry.

First, a significant difference was found between the two stages of grocery distribution, i.e., the manufacturer-wholesaler link and the wholesaler-retailer link. The media used to place orders between manufacturers and wholesalers are mainly telephone and facsimile, while EDI is widely used between wholesalers and retailers.

Second, the use of EDI spread rapidly in the relationship between wholesalers and retailers in the 1980s.

Third, a big difference is found between the distribution of dry groceries and that of toiletries, although there are a lot of similarities among the two industries. EDI is used more widely between manufacturers and wholesalers in the toiletry industry than in the dry grocery industry.

We tried to find factors in media choice by exploring why there is a big difference between the stages of distribution, why EDI diffused widely between wholesalers and retailers in the 1980s, and why there is a big difference between the industries.

We conducted face-to-face interviews with twenty-seven people (who take/took charge of management, information systems, logistics, sales for wholesalers/retailers, and purchases) of eleven corporations — manufacturers of dry groceries, wholesalers of dry groceries and toiletries, and supermarkets — in the summer and fall of 1994 (see Table 1).

3.2 Research Framework

Factors in Media Choice. While this was an exploratory study, we felt the need to have a structured framework to conduct the interviews. Thus we developed the following model.

For this research, we assumed that media choice is determined by a fit between the characteristics of the media and (1) the attributes of information flows among firms and (2) management assets. Furthermore, the required attributes of information are influenced by (i) attributes of physical distribution and (ii) share of transactions with a business partner (see Figure 1).

First, the required attributes of information flows among firms have to fit with the abilities of information processing of the media, taking the costs of the media into account. The attributes of information flows include speed, quantity, fluctuation, accuracy, quality, pattern of access, etc.

There are two factors that affect the attributes of information flows in transactions between firms. First, the attributes of physical
distribution, such as speed, quantity, fluctuation, requirements of accuracy, nature of products, variety, package size, pattern of delivery, etc., often are closely concerned with information flows. Kokuryo (1992) assumes that media choice in order placements is determined by the fit between these characteristics of media and the patterns of order placement, and the patterns of order placement are related to logistics service characteristics and logistic infrastructure.

The second factor is the share of transactions with a business partner. The design of information flows with partners whose transaction volume is relatively large might differ from that with partners whose transaction volume is relatively small.

Accordingly, media choice is influenced by attributes of physical distribution and share of transactions with a business partner through the attributes of information flows.

Second, media choice is also influenced by the quantity and composition of management assets because media choice is a kind of investment decision. For example, as we mentioned in section 2.2, transaction-specific assets will restrict media choice.

Characteristics of Media. As we mentioned earlier, the characteristics of media that affect media choice can be divided into two categories: (a) ability of information processing and (b) cost.

For this research, we assumed the following media characteristics, building on the Kokuryo framework:

(a) ABILITY OF INFORMATION PROCESSING
(1) Speed of transmission
   - distance per unit of time
(2) Capacity of transmission
   - amount of information per time
(3) Set-up time
   - time to initiate a session of communication with a partner
(4) Capacity of coding/decoding information
   - capacity of the process by which a sender translates his information to the codes according to agreements between organizations and a receiver decodes it to inform his organization
(5) Accuracy of coding/decoding
   - mistakes or misunderstanding in the coding/decoding process
(6) Ability to process unstructured information
   - whether or not a medium distinctly restricts data structure
(7) Interactivity
   - necessity for senders and receivers to be present at their respective ends of the channels and ability to communicate with each other on a real time basis (Rogers 1986)

(b) COST
(8) Transaction-specificity
   - the degree of ease to divert a medium used to communicate with one partner for use in transacting with others
4. RESEARCH FINDINGS

Through the exploratory research, we confirmed that our model was approximately appropriate and identified concrete variables and the relations between these variables. There were five factors in media choice.

- The design of physical distribution
- Share of transactions with a business partner
- Firm’s solvency for media costs
- Installed base of facilities
- Mutual complementarity among media

4.1 The Design of Physical Distribution

The first factor is the choice of the design of physical distribution.

The attributes of physical distribution, that is, variety of products, frequency of delivery, unit size of delivery, lead-time, punctuality of delivery time, shortage, and mistaken delivery, are closely related to the following attributes of information flows: required amount of information per unit of time, accuracy, and ability to link various kinds of information (e.g., link between order placements and notice of delivery). Media choice is determined by the fit between the following attributes of information flows and the characteristics of the media: transmission capacity, capacity of coding/decoding, accuracy of coding/decoding, costs of coding/decoding, and ability to process the structured information.

Retailers of dry groceries imposed tighter requirements for required physical distribution on wholesalers in the 1980s. That is, the variety of products rapidly increased, the size of delivery units became smaller, lead-time became shorter, and punctuality for delivery time, shortages, and mistakes became more rigorous. At the same time, the information flow between wholesalers and retailers increased, with higher requirements for speed and accuracy. The conventional media, i.e., telephone and face-to-face, failed to meet these requirements. Telephone and face-to-face cannot transmit large amounts of information quickly, and these media forced firms to re-type inputs several times, which became the source of mistakes. EDI, on the other hand, is a medium in which capacity of transmission is high. It is also superior in coding/decoding capacity, accuracy, and cost. This is why EDI spread rapidly in the 1980s.

Nowadays, the usage rate of EDI for order placements is estimated at more than 70% of the total amount of transactions between wholesalers and retailers. As for large-scale chain stores, the usage rate of EDI reaches nearly 100%.

While EDI is widely used between wholesalers and retailers, the telephone and facsimile are mainly used between manufacturers and wholesalers of dry groceries. The usage rate of EDI is estimated at less than 10% of the total amount of the transactions in this case. Our research suggests that the EDI diffusion rate is low in this segment because the number of items for a sender is smaller, the unit of delivery is larger, the frequency of delivery is lower, and punctuality for lead-time, time of delivery, shortage, and mistakes are more generous than between wholesalers and retailers.

4.2 Share of Transactions with a Business Partner

The second factor in media choice is the share of transactions with a business partner.

Regarding this factor, we observed two typical cases in our research. One case was the alliance of Ryoshoku and Sotetsu-Rosen, and the other was the Support System.

Ryoshoku is a major wholesaler of dry groceries and Sotetsu-Rosen is a regional medium-size supermarket chain. In general, supermarkets purchase dry groceries from five to a few dozen wholesalers. Previously Sotetsu-Rosen traded with twenty-three wholesalers of dry groceries, but it consolidated the transactions into five wholesalers, especially Ryoshoku, in September 1993. At the present time, Ryoshoku supplies 75% of Sotetsu-Rosen’s purchase of dry groceries (8 billion yen). Ryoshoku provides rationalized logistics systems, preparing a picking line and delivery cars specifically designed for Sotetsu-Rosen. The products are loaded on the mobile racks in a sequence identical to the sequence of Sotetsu-Rosen’s store shelves. This greatly reduces the retailer’s labor cost for shelving the products. Deliveries are made to stores punctually on schedule every day. The inspection upon receipt at stores is eliminated because the accuracy of picking by Ryoshoku is very reliable. EDI is used not only for order placements but also for shipment notice, invoice, and payment. As a result, no printed vouchers are necessary between them. Inventory costs and personnel expenses at stores are reduced by around 10% and the rate of shortage improved from 1.7% to 0.2%.

The Support System specializes in providing physical distribution services for regional small-size chains and independent stores. The Support System is financed by various regional wholesalers. Usually, wholesalers deliver only one product category, such as groceries, toiletries, or sweets. The Support System, however, delivers all kinds of products that the stores require. The stores
completely depend on the distribution services of the Support System and all orders from the stores are received by the Support System. The Support System is not strictly a wholesaler, since it never actually owns the products. Although small-size independent stores hardly ever adopt EDI, all stores are using EDI for order placements in this case.

In the above two cases, the consolidation of distribution, i.e., a high share of transactions with a partner, enables the effective use of EDI because the simplification of information flows helps structuralize daily operations and EDI is suitable for processing structured information.

4.3 Firm’s Solvency for Media Costs

One of the factors in media choice that is caused by management assets is the firm’s solvency for media costs.

In the distribution of dry groceries and toiletries, there is a custom that firms receiving orders pay the costs of transmitting order placements. Thus, media that require a large fixed investment, high running costs, and/or have a small chance of being diverted to other uses or to other trade partners do not diffuse when the scale of the firm receiving orders is small even if the ordering firm is big.

In the logistics systems of dry groceries, one barrier against the diffusion of EDI among manufacturers and wholesalers is the existence of a large number of small-scale manufacturers (receivers of orders). Wholesalers have to trade with a large number of manufacturers to maintain a wide variety of products. EDI, on the other hand, is diffused among wholesalers and retailers because powerful retailers are increasingly consolidating trade in favor of large wholesalers that can develop systems. Conventional small-sized wholesalers are being eliminated in the process.

Daiei, the biggest chain store in Japan, intends to reduce the labor cost at stores, as well as inventory cost at stores and distribution centers. To this end, Daiei implemented a new logistics system named CATS (Concentration and Assortment System), a cross-docking system of small delivery units. In CATS, vendors have to deliver small amounts of various goods in an extremely short time. EDI order placement is essential for this system. However, not all vendors have been able to develop systems for Daiei, so Daiei has been consolidating its sources to large-scale wholesalers.

In the logistics systems of toiletries, the usage rate of EDI between manufacturers and wholesalers is higher than that in dry grocery distribution.

Toilet distribution is similar to dry grocery distribution in such dimensions as required temperature control, average size, shape, ease of description of product, high source marking rate of standardized product codes (JAN code), picking and delivery methods, and formats of retailers. The differences are that the permissible period of storage is long, the stock turnover rate is slow, the frequency of delivery is low, and lead-time is generous. Thus, the requirement for physical distribution of toiletries is less stringent that for dry groceries. This would lead us to expect that EDI adoption is lower in toiletry distribution than in dry grocery distribution.

In fact, however, there is a higher level of diffusion of EDI in the logistics systems of toiletries than in dry groceries. This can be explained by the higher level of concentration (i.e., the average size) of toiletry manufacturers relative to dry grocery manufacturers.

4.4 Installed Base of Facilities

The fourth factor is that the assets that have already been invested by firms influence media choice.

The introduction of a new medium necessitates large investment in installing facilities, software and training staff. In addition, significant changes in daily operations also become necessary. Accordingly, these explicit/implicit switching costs impede any change in media.

In the 1980s, each chain store separately implemented proprietary ordering system due to the necessity to control the increased variety of products. Thus, codes and formats in EDI are quite different among retailers. Wholesalers must prepare a customer specific database of product codes and order processing software. Although wholesalers recognize the cost advantages of standardization, the costs of making necessary system changes prevent the standardization of EDI.

4.5 Mutual Complementarity among Media

The fifth factor is complementarity among media. In general, each medium’s strengths and weaknesses vary, as we have already discussed. Consequently, one medium is often complementary to another.

In the case of Ryoshoku and Sotetsu-Rosen, a large amount of structured information regarding order placements, physical distribution, and payment is exchanged at high speed by EDI, while meetings are held once a month involving about twenty people from each company. Meeting members include managers and representatives of merchandising, physical distribution, information systems, and accounting. Thus, the more structured, quantitative, one-way information that is exchanged efficiently by EDI is complemented by the unstructured, qualitative, interactive information of face-to-face.
5. DISCUSSION

Based on our framework that media choice between firms is determined by a fit between the characteristics of the media and the attributes of information flows and the quantity and composition of the firms' assets, we find five factors in media choice: the design of physical distribution, the share of transactions with a partner, the firm's solvency for media costs, the installed base of facilities, and mutual complementarity among media.

These factors are not perfect or strictly proved because this is the first trial of the exploratory research. We will be able to conduct a few more exercises in identifying the relevant factors in other areas, such as distribution of apparel. There is, of course, the opportunity to develop the research into a more quantitative research. We saw the benefit in making the comparison by industry segment units (except in the case studies of advanced firms) because we observed conspicuously large differences in media adoption along this line and we considered this unit of analysis to be suitable for the purpose of our exploratory research. This choice, however, barred us from conducting a quantitative study. We will be able to conduct a more quantitative research using individual firms as analytical units.

Furthermore, we feel the opportunity and the need to develop this research into a dynamic study. This research has been a static research, one in which we tried to explain why firms are using the media they are using. We will be able to conduct the dynamic study by examining what prompts the firms to change their interorganizational communications media, how that is implemented, and the outcome of the changes.

This study was also an attempt to explain media choice as a dependent variable. We have thus treated such factors as industrial structure as independent variables. While this has been a necessary operation for the purpose of this research, we feel that the causal relations are much more complex than we assumed in this research. We therefore feel the need to study how media affect industrial structure upon their introduction.

6. REFERENCES


