

Effects of Human Communication on a Web-based Information System

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Abstract:

Objectives: This study investigates how human communication helps promote the use of information systems that intermediate businesses; it does so by studying a load-matching system used in the transportation industry. Load-matching systems are designed to increase the transportation efficiency of trucking companies. Most load-matching systems in Japan are inactive; the Japan Local Network System (JL) is one of the few successful load-matching services.

Materials and Method: A questionnaire survey was administered to 663 member corporations of the JL. A total of 145 responses were received (response rate: 21.9%); of these, 38 were excluded due to missing values, leaving a final sample of 107. The respondents provided appropriate values for each of the seven variables, that is, human communication, meta-information, access to the system, entry load information, matching load, entry truck information, and matching truck.

Results: We constructed several structural equation models via covariance structure analysis. In the model adopted in this study, all paths were significant at the 1% level. Furthermore, the conformity indices were satisfactory ($\chi^2 = 15.43$, GFI = .961, AGFI = .909, CFI = .991, RMSEA = .051, AIC = 47.243).

Conclusions: This study examined the effect of human communication on the use of an information system. We investigated the key factors that promote trade in a web-based load-matching service by undertaking a positive analysis of the results of a questionnaire survey administered to members of the JL, a successful web-based load-matching service that encourages members to exchange and distribute information via face-to-face communication. The results of covariance structure analysis revealed that increased information distribution promotes the intermediary service and that metadata sharing helps increase the number of transactions. Metadata were also found to be acquired via face-to-face communication.

Keywords: *Small- and Medium-sized Truck Carrier, Load-matching system, Human communication, Information sharing, Covariance structure analysis, Logistics in Japan*

1. OBJECTIVES

This study focuses on a load-matching system that intermediates load and load-board information in Japan. The use of this system is expected to greatly improve the transportation efficiency of small- and medium-sized truck carriers, neither of which have a nationwide transportation network or physical distribution bases. Unlike large forwarding agents, many of which have built a nationwide base network to increase loads, small carriers with only one office find it difficult to increase their loads. They have therefore attempted to increase their transportation efficiency and load factor, as well as the working rate of their rolling stock, by forming links with other carriers, so that each acts as a branch for the others.

A web-based load-matching system matches load and load-board requests. Transactions are carried out by members who post their requests on the webpage and search for a match.

Load and load-board requests are posted together with other information, such as the data, hours, destination, and charges desired. A member requesting a load also registers truck information and the wait time for the member(s) who require a load to be transported. Similarly, a member requesting a load-board posts information on the load and wait time for the member(s) who require the load. This entire dataset comprises 'load-matching information', and it is consumed within a single transaction.

With the expansion of the Internet, focus has shifted to web-based load matching. Web use is expected to reduce the introduction cost and increase the volume of information exchange, thereby increasing the number of business opportunities. Many web-based load-matching systems were constructed in the early 2000s and saw an increased number of users. Nonetheless, the results have been disappointing. Most web-based load-matching systems in Japan have been

suspended or closed, chiefly due to insufficient carrier or load requests.

The Japan Local Network System (JL) is one of the few successful exceptions. The association in charge of operating the JL (hereafter, the 'association') holds meetings to encourage interaction among its members. The members communicate not only via the web but also face to face; such real-world interaction is likely to have significant business consequences. The members of JL share information to enhance truck and load matching, meta-information, via human communication.

We assume that face-to-face human communication and meta-information acquired via that communication encourages members to use the JL's load matching system. Therefore, our study demonstrates the assumption through a questionnaire survey.

2. MATERIAL and METHODS

2.1 Case study

As of the end of the fiscal year 2008, the JL had 1,645 business cooperative members. The main objective of the JL is to facilitate transactions via an online load-matching system. In 2014, the service had an annual turnover of about JPY58 billion; it handles about 400,000 transaction contracts and about 650,000 requests each year. Based on its basic principles of 'being faithful and respecting the art of commerce' and building a human network, the association attaches much importance to offline meetings in which people interact with each other.

2.2 Survey Methods

A questionnaire survey was administered to 663 member corporations from 51 JL branches in the Hokkaido, Tohoku, and Kanto regions. The survey was executed between September 17 and November 24, 2009. A total of 145 responses were received (response rate: 21.9%); of these, 38 were excluded due to missing values, leaving a final sample size of 107.

2.3 Response Method

The respondents provided appropriate values for each of the seven variables, that is, human communication, meta-information, access to the system, entry load information, matching load, entry truck information, and matching truck.

3. RESULTS

3.1 Covariance Structure Analysis (Path Analysis)

The covariance structure analysis shows a causal relationship between phenomena. We constructed several structural equation models via covariance structure analysis, which was conducted using Amos19, and the maximum likelihood method was used for estimation. Our model intends to show

that human communication and meta-information affect access, entry and matching, and entry effects matching.

In the model adopted in this study, all paths were significant at the 1% level. The path coefficient from human communication to meta-information was .292, that from access to the system to entry load information was .277, that from meta-information to entry load information was .274, that from entry load information to matching load was .863, that from access to the system to entry truck information was .710, that from meta-information to matching load was .126, that from entry load information to entry truck information was .225, that from entry truck information to matching truck was .360, and finally, that from matching load to matching truck was .356. Furthermore, the conformity indices were satisfactory ($\chi^2 = 15.43$, GFI<Goodness of Fit Index> = .961, AGFI<Adjusted Goodness of Fit Index> = .909, CFI<Comparative Fit Index> = .991, RMSEA<Root Mean-Square Error of Approximation> = .051, AIC<Akaike's Information Criterion> = 47.243), which assures that the sample size(n=145) was sufficient.

4. CONCLUSIONS

This study examined the effect of human communication on the use of an information system. We investigated the key factors that promote trade in a web-based load-matching service by undertaking a positive analysis of the results of a questionnaire survey administered to members of the JL, a successful web-based load-matching service that encourages members to exchange and distribute information via face-to-face communication. The results of covariance structure analysis revealed that increased information distribution promotes the intermediary service and that metadata sharing helps increase the number of transactions. Metadata were also found to be acquired via face-to-face communication. Our results indicate that a system that allows for human communication and for the sharing of metadata among members can be effective.