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CHANGES IN INTER-ORGANISATIONAL COOPERATION NETWORKS DUE TO DIGITALISATION IN THE INSURANCE INDUSTRY

Abstract:

The aim of this study is to empirically identify how the structure of inter-organisational collaboration is changing in today's increasingly digitalised insurance industry.

Traditionally, inter-organisational relationships in the insurance industry have been vertically integrated, mainly with major insurance companies. With the advent of digitalisation, the areas covered by insurance, such as disease prevention, are expanding through the linkage of various big data. It can be inferred that the structure of cooperation between related organisations and their core organisations is changing accordingly.

As a research method, this study analysed information on actual inter-organisational relations using the method of social network analysis. The linkage network structure of the organisations that are expanding inter-organisational cooperation was then analysed.

The results of the analysis show that the organisations that are expanding inter-organisational cooperation have an open and mediated network structure.

It was shown that inter-organisational relations in the insurance industry may be shifting from a vertically integrated structure to a platform type, similar to the IT industry.

Keywords:

inter-organisational collaboration, InsurTech, social network analysis

JEL Classification: M15, O33, I13

1   Introduction

This research presentation reports the results of additional analysis, adding new data, based on my research presentation in 2023 (Isada, 2024). In the previous research presentation, I analysed data from Japan up to 2022, but in this research report, I analyse global data up to 2023 [1]. A brief summary is provided for descriptions that overlap with those in the previous presentation.

The health insurance industry is experiencing a structural shift due to digitalization, known as InsurTech. This study aims to explore how these changes affect the network structure among organizations. InsurTech innovations are transforming insurance delivery, business models, and customer experiences (Stoeckli et al., 2018). Technologies like big data analytics, robo advisors, mobile distribution, and blockchain are enabling InsurTech companies to challenge traditional insurance institutions (Greineder et al., 2020). The traditional health insurance industry is dominated by a few large companies in a highly centralized structure. This stability is due to the nature of insurance products, which cover rare but significant losses, requiring companies to have substantial financial capacity and high reliability. Long-term relationships and trust are crucial between insurance companies and their affiliates. InsurTech has expanded the role of insurance products beyond medical care to include daily prevention and health promotion. This shift is driven by social needs like efficient medical expense use due to demographic changes.

The focus is on utilizing big data from sources like Personal Health Records (PHR), Electronic Medical Records (EMR) and Electronic Health Records (EHR). Companies like Apple are entering this field to offer personal health management and early medical intervention. However, integrating big data from individuals and medical institutions requires reorganizing business processes and ensuring high confidentiality. Strategic alliances are crucial for effective data use, enabling coordinated and integrated business processes and easier sharing of confidential data. This study aims to analyse changes in alliance structures among health insurance firms, focusing on those expanding their alliances. It uses social network analysis to quantitatively evaluate these network structures.

2   Previous Studies

Big data is driving insurance companies to enhance operations, improve customer service, and personalize offerings to boost revenue (Banu et al., 2022). The IAIS (2017) outlines three potential FinTech scenarios: traditional insurers maintaining customer relationships, fragmentation of the insurance value chain, or tech giants dominating the market. Digital transformation introduces new roles and challenges traditional insurers, with start-ups and incumbents forming a dynamic ecosystem of collaboration and competition (Van-Meeteren et al., 2021). So far, few previous studies have analysed inter-organisational relationships in health tech using social network analysis methods. Park et al. (2022) analysed the digital healthcare industry in Korea from 2016 to 2021.

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[1] Some of the results of this presentation have been reported in Yasuda, Lee, Odaka, and Isada (2023) and Lee, Odaka, and Isada (2024). In this research, I have added new data and conducted additional analysis.

3   Research hypotheses

InsurTech is in its diffusion phase and this study aims to identify leading organisations and their characteristics in an exploratory manner. For this purpose, real-life examples of InsurTech-related organisations from all over the world were included in the analysis. Particular attention was paid to inter-organisational collaboration, as it is considered to be one of the key elements in the diffusion of InsurTech. The expansion of the number of inter-organisational collaborations was used as an indicator of the extent of the diffusion of InsurTech in this study. This is because InsurTech is considered to spread when more organisations work together to create InsurTech mechanisms and share data, and this is considered to be an important goal for each relevant organisation.

It can be inferred that traditional inter-organisational collaboration in the insurance industry consists of the formation of corporate groups led by major insurance companies, with a structure of relatively vertically integrated collaboration within the group. Within the group, close cooperation and complementary relationships are formed to maintain resources and information, stabilise management and form user trust. On the other hand, in InsurTech, for example, various organisations beyond the conventional framework of the insurance industry, such as insurance companies, IT and AI companies, and companies providing related services, are expected to work together to develop new products. Therefore, it is considered that the more organisations promote InsurTech, the more open the relationships between them are. The following hypotheses can therefore be derived.

Hypothesis 1. The more open the inter-organisational relationships regarding InsurTech are, the greater the number of inter-organisational collaborations.

The structure of inter-organisational relations in the IT industry can be characterised as so-called platform organisations and their complementary organisations. This is a structure in which an organisation, which is called a platform, provides a mechanism for intra-industry or cross-industry inter-organisational cooperation, and various organisations cooperate through this mechanism. In particular, a structure in which organisations providing various products and services are linked to their users through platforms is called a two-side platform (Parker & Van Alstyne, 2000). It has been pointed out that this structure of inter-organisational relationships facilitates the network effect, in which the expansion of products and services available on the platform and the expansion of users are co-progressively promoted, and the diffusion of an ecosystem (organisational ecosystem) centred on the platform is promoted.

It can be inferred that a similar structure of inter-organisational relationships is a facilitating factor in the diffusion of InsurTech. When InsurTech spreads, it is likely to become a horizontal division of labour type inter-organisational relationship, with companies that collaborate across multiple healthcare domains, such as prevention, treatment and prognosis, becoming platform players and forming complementary relationships with a variety of other companies. A characteristic feature of the network structure is that it is positioned to bridge multiple other firms. The following hypotheses can therefore be derived.

Hypothesis 2: The more platform-type the inter-organisational relationship regarding InsurTech is, the greater the number of inter-organisational collaborations.,

4   Data and analysis methods

4.1   Data

Information on inter-organisational alliances in InsurTech, the source of the analysis, was collected from newspaper articles and press releases from companies and others. The Lexis database provided by LexisNexis of the USA was used as the source of the newspaper articles. Lexis enables full-text searches of information from more than 100 leading newspapers worldwide, including The New York Times, Los Angeles Times, Le Monde, etc., and enables more comprehensive information to be collected. This enables a more comprehensive collection of information. In addition, newspaper articles alone are limited in the information they contain, but by adding information on press releases, it is possible to supplement the information in newspapers. The period covered by the study was six years, from 2018 to 2023, the period when InsurTech started to become more widespread.

4.2   Method of analysis

The structure of the network surrounding each company was analysed using the method of social network analysis, which was used as an analytical method, with each company as a node and the partnerships between companies as edges. Various network indices can be calculated by network analysis to indicate the characteristics of the network structure, and the following network indices were used in this study.

First, for the objective variable, the expansion of the number of partnerships of each organisation, the size of the network of each organisation was used as a proxy variable. In other words, the degree of expansion of the partnerships was evaluated in terms of the number of partners of each organisation, as announced in newspapers or press releases. To assess the expansion of partnerships, the period covered by the study was divided into two periods: the first half, from 2018 to 2020, and the second half, from 2021 to 2023, and the rate of increase in the number of partnerships from the first half to the second half was used. As shorter evaluation periods are more susceptible to short-term factors such as special events, it was decided to evaluate the partnerships that occurred over a relatively long period of three years.

Next, among the explanatory variables, ego-network density was used as an indicator of the closure or openness of inter-organisational relationships in hypothesis 1. Ego-network density is an indicator that calculates the degree to which other nodes that are connected to a node are also connected to each other. For example, the value of ego network density tends to be high when there is close cooperation between a relatively limited number of organisations, such as in so-called keiretsu transactions in the automobile industry. On the other hand, when the relationships between organisations are open, the value of density tends to be low.

The betweeness centrality of the ego network was used as an indicator of platform-type inter-organisational relationships, as in hypothesis 2. Betweeness centrality is an indicator that calculates the degree to which other nodes are connected through a particular node; the value of betweeness centrality tends to be high for platformers, such as those in the IT industry known as big tech. Note that the normalised betweenness centrality (nEgoBetweeness) was used as the network index, as the number of mediating nodes in the network structure generally tends to increase as the size of the ego network increases. UCINet 6 was used to calculate the network index and SPSS 27 was used for statistical analysis.

5   Survey results

5.1   Basic statistics

Extracting the collaborative relationships between organisations involved in InsurTech between 2018 and 2023, the number of organisations that had some kind of external partnership and the average, maximum and minimum number of partnerships for each organisation are shown in Table 1. Note that collaborative relationships include a variety of cooperation relationships, such as strategic alliances, partnerships, joint ventures and joint R&D. The number of alliances is the number of pairs between organisations, for example, one alliance between Company A and Company B is counted as one, and three (A-B, A-C and B-C) for an alliance between three organisations, Company A, Company B and Company C.

The number of collaborative relationships related to InsurTech has increased over the years and, although the average number of collaborations per organisation has not changed much, a trend towards an increase in large-scale collaborations was observed.

Table 1. Number of organisations and partnerships involved in InsurTech-related collaborations

Year	2018	2019	2020	2021	2022	2023
Number of organisations	798	2,911	2,079	3,089	3,462	3,837
Average Size	3.28	3.40	4.02	4.07	5.42	4.00
Maximum Size	46	47	69	44	84	84
Minimum Size	1	1	1	1	1	1

5.2   Analysis results

Next, in order to test each of the aforementioned hypotheses, the network index was calculated for each organisation's ego network in the first half of the period from 2018 to 2020 and the second half from 2021 to 2023, as well as the rate of change in the number of linkages from the first to the second half for each organisation. A regression analysis was then conducted with the rate of change in the number of linkages as the objective variable and the network variable as the explanatory variable. The results of the regression analysis are shown in Table 2.

Table 2. Relationship between the rate of change in the number of linkages and the network index

	Model 1	Model 2
Regression coefficient		
Density	-0.007	
nEgoBetweeness		0.007
F-value	45.931**	41.611**
t-value	-6.777**	6.451**

Note1: The rate of change in the number of linkages as the objective variable

Note2: **: Significance level 1%.

6   Discussions and conclusions

First, the aforementioned hypotheses are discussed based on the results of the quantitative analysis. The first hypothesis was the hypothesis on the openness of inter-organisational relations. The results of the quantitative analysis showed that the lower the density of inter-organisational relations, i.e. the more open inter-organisational relations are, the greater the extent of inter-organisational collaboration. From the results of this analysis, it can be inferred that in InsurTech, inter-organisational cooperation is more extended in diverse cooperation than in close cooperation between a limited number of organisations.

The second hypothesis concerned platform-type inter-organisational relationships. The results of the quantitative analysis indicated the possibility that the higher the betweenness centrality of the organisations, the greater the expansion of inter-organisational collaborative relationships. It can be inferred that the structure of inter-organisational relationships regarding InsurTech is similar to that often observed in the so-called IT industry. Over the six years of the study period, the three organisations with the highest number of inter-organisational collaborations on InsurTech were Microsoft, Google (Alphabet) and Amazon (including AWS and Amazon Web Services), and not existing insurance companies. These companies have rapidly expanded their collaboration networks in recent years, and it can be inferred that the nature of their inter-organisational relationships is platform-based. These non-traditional players may be changing the structure of the insurance industry as a whole in the future.

In this study, a large database of actual cases of inter-organisational relationships related to insurTech was constructed and a quantitative analysis of the overall time-series trends was carried out. As a future task, the database constructed this time will be used to further clarify the specific factors behind the changes in the industry structure.

7   Acknowledgements

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