

How is Social Capital Associated with Perception of AI? – An Observation from a Survey of Residents in Metropolitan Tokyo Area

Yoji Inaba*

*¹ Nihon university

Abstract

Numerous studies over the past 30 years have examined the relationship between social capital (SC) and information and communication technology (ICT). However, few studies have examined the association between artificial intelligence (AI) and SC. This study addresses this gap using a Web survey (N=5000) carried out in the Tokyo metropolitan area in Japan in 2018. The survey included questions on ICT literacy and SC (networks, trust, norms of reciprocity), as well as questions on perceptions of AI including its impact on society. The author found a statistically significant positive association between cognitive SC (trust and norms of reciprocity) and positive perceptions of AI. However, the impact of structural SC (networks) on AI perceptions was either nonexistent or negative. Structural SC created by group participation, as well as contact with others, including those in the workplace, does not create positive perceptions of AI, and could even be a source of negative perceptions of AI. Cognitive SC may function as a promoter of AI, while structural SC may function as a precaution to AI. Both types of SC might assume important roles for the smooth transition to the AI era.

Keyword: Social Capital, ICT, AI, Networks

1. Introduction

1. Introduction

Numerous papers and articles have been written on the relation between social capital (SC) and information communication technologies (ICT) in the past thirty years. Artificial intelligence (AI) which obviously overlaps with ICT is another popular subject in recent years. Yet few papers deal with the association between AI and SC. This paper is an attempt to fulfill the gap based on a web survey (N=5000) the author carried out in the metropolitan Tokyo area in Japan in 2018. The survey asked questions on ICT literacy, SC (networks, trust, norms of reciprocity) as well as perceptions on the AI and its impact on society.

2. Preceding studies and research questions

2.1 Preceding studies

Introduction of ICT until the middle of 2000s functioned both complementary and/or substitutionary to the existing offline SC (1st Wave). Then online structural SC created by ICT mainly enhanced offline cognitive SC (2nd Wave). Currently the offline SC backed up by online structural SC mostly seems to have positive impact on ICT applications to the society. Although ICT literacy and SC were originally mutually correlated, main

concern on causality have shifted from ICT to SC rather than vice versa.

2.2 Research questions

The present study deals with the following research questions which have not been fully fulfilled by preceding studies.

RQ1 How will SC affect ICT literacy? Although many papers have dealt with ICT, most of them examined impact of just a particular type of ICT. The lack of comprehensiveness could be said about the preceding studies dealing with SC. As for SC, it covers various concepts including networks, trust, and norms. To the best of our knowledge, there is no paper which is based upon comprehensive pictures of both ICT literacy and SC. This is especially the case on the impact of SC to the ICT literacy. Therefore the present paper shed the light on this aspect.

RQ2 How will SC affect the perception of AI? Are there any implications which could be inferred by the way SC is associated with ICT applications?

RQ3 How will AI affect SC? Are there any implications which could be inferred from an analysis on the way ICT literacy is associated with SC?

RQ4 What are the policy implications to cope with negative impact of AI introduction if there is any?

3. Materials and Methods

3.1 Data

The dataset used in this study comes from a questionnaire survey that we conducted between September 4th and 10th, 2018 over the internet. The survey covers residents in Metropolitan Tokyo area including Tokyo, Kanagawa, Chiba, and Saitama prefectures between the ages of 20 and 69 years. The survey questionnaires were sent and recovered through the internet. We got reply from 5000 people.

The Questionnaire survey was conducted on the following topics:

① ICT literacy

- 8 questions on the availability of ICT devices (yes or no),
- 14 questions on the frequency of use of ICT devices and web services with a three-point Likert scale,
- 8 questions on capability of soft wares and web services usage with a four-point Likert scale,
- 6 questions on the experience of using AI related equipment with a three-point Likert scale.

② SC

12 questions are asked with regard to SC.

- 8 questions related to structural SC including group participation, relationships with neighbors, family members and relatives, friends and acquaintances, and colleagues (from four to seven-point Likert scales),
- 4 questions related to cognitive SC including trust and norm of reciprocity with a four-point Likert scale.

③ Perception on AI

The questionnaire dealt with 30 items on respondents' perception with regard to AI.

- 7 questions about evaluations on the influence of AI (one five-choice question and 6 Likert scale questions with a four-point)
- 8 questions related to pros & cons on AI use in our society at 8 situations with a five-point Likert scale,
- 8 questions on personal preference of AI use at 8 situations with a five-point Likert scale,
- 7 questions on the choice between AI or human beings at 7 situations with a four-point Likert scale.

In addition, the survey asked personal attributes of respondents including sex, age, educational attainment, marital status, occupation, forms of employment (permanent or temporary), family income, number of cohabiting people, duration of residence, the name of municipality they reside, and perception on risk.

Concerning the ethical appropriateness of the contents of the questionnaire, the survey was checked and approved by the ethical committee (social science) of the Tohoku University.

3.2 Methodology

I conducted three factor analyses using the above mentioned data on ICT literacy, SC, and perception of AI in order to get basic factors out of these questions in each of the three groups. Then, using factor scores as explanatory variables, two logistic regressions are carried out. First, logistic regressions between

ICT literacy and SC. As an extension of the third wave of preceding studies which try to explain the behavior of ICT by SC, we used SC factors as independent variables to explain the changes in ICT literacy factors. Secondly, another series of logistic regression on perceptions of AI, using SC as independent variable controlling ICT literacy and characteristics of respondents.

4. Results

Statistically significant positive associations between cognitive SC and affirmative perception of AI use were observed. However, impact of structural SC on AI perception is either none existent or negative. Structural SC created by group participation as well as contacts with others including those at work place does not create affirmative perception on AI. On the contrary, they could be a source of negative AI perception.

References

- Ahmed, Zafor (2018) "Explaining the unpredictability : a social capital perspective on ICT intervention", *International Journal of Information Management*, 38, 175-186.
- Bauernschuster, S., F. Oliver, W. Ludger, (2014) "Surfing alone? The internet and social capital: Evidence from an unforeseeable technological mistake", *Journal of Public Economics*, vol. 117, issue C, 73-89
- Terashima, K., and A. Miura (2013) "Does use of SNS develop offline/online social capital", *Kwansei Gakuin University Bulletin of Psychological Science*, Vol. 39, 59-67. (in Japanese)
- Kobayashi, T., & Ikeda, K. (2006). The development of social capital in communities in an online game: A perspective on a "spill over" effect into the offline world. *Japanese Journal of Social Psychology*, vol. 22-1, 58-71. (in Japanese)
- Hsieh, J.J.P., Rai, A., & Keil, M. (2010). Addressing digital inequality for the socio- economically disadvantaged through government initiatives; Forms of capital that affect ICT utilization. *Information Systems Research*, 233-253.
- Ishizuka, M., et al. (2017) "Introduction" In *The Japan Society for Artificial Intelligence* (ed.) *Encyclopedia of Artificial Intelligence*, Kyouritsu Publishing, p.2 (in Japanese) .
- Li, Xiaoqian and Wenhong Chen (2014) "Facebook or Renren? A comparative study of social networking site use and social capital among Chinese international students in the United States" *Computers in Human Behavior* 35, 116-123
- Lu, J., Yang, J., & Yu, C. (2013). Is social capital effective for online learning? *Information & Management*, 50, 507-522.
- Miyakawa, Tadao, and Omori Takashi (2004) *Social Capital*, Toyo Keizai (in Japanese).
- Miyata, Kakuko (2005a) *Social Psychology of the Internet – the function of the internet from a viewpoint of social capital*, Kazama Syobo (in Japanese).
- Miyata, Kakuko (2005b) *Media as a bridge among human ties – Social Capital in the Era of the Internet*, NTT Publishing (in Japanese).
- Miyata, Kakuko, Barry Wellman, and Jeffrey Boase. (2005c) "The Wired — and Wireless — Japanese: Webphones, PCs and Social Networks." *Mobile Communications. Computer Supported Cooperative Work*, Springer, vol 31. pp.427-449.

- Naranjo-Zolotov, Mijail et al. (2019) “Examining social capital and individual motivators to explain the adoption of online citizen participation”, *Future Generation Computer Systems*, 92 302–311
- Nie, Norman, and Lutz Erbring (2002) “Internet and society: Preliminary Report”, *IT and SOCIETY*, Vol 1, 275-283.
- Nolan.S, Hendricks.J, Amanda.T,(2015) “ Social networking sites (SNS); exploring their uses and associated value for adolescent mothers in Western Australia in terms of social support provision and building social capital” *Midwifery* 31,912–919
- Norris,Pippa (2003),“Social Capital and ICTs: Widening or Reinforcing Social Networks?”presented at the“International Forum on Social Capital for Economic Revival”held by the Economic and Social Research Institute, Cabinet Office, Japan in Tokyo,24-25th March 2003、
- Penard,Thierry and Nicolas Poussing (2010) Internet use and social capital; the strength of virtual ties, *Journal of Economic Issues*, 44(3), 569-595.
- Ryan, S. (2010). Information system and healthcare XXXVI: Building and maintaining social Capital-Evidence from the field. *Communications of the Association of Information Systems*, 27(18), 307-322.
- Salahuddin, Mohammad et al. (2016) “Does internet stimulate the accumulation of social capital? A macro-persective from Australia” *Economic Analysis and Policy*, 49, 43-55.
- Zhong, Zhi-Jin (2014) “Civic engagement among educated Chinese youth: The role of SNS (Social Networking Services), bonding and bridging social capital” *Computers & Education* 75,263–273
 [urname of the first author Year]
 Names of authors, Title, Journal, Publisher, Year.