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**Teletrabajo para el desarrollo sustentable**

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# **An analysis of the trend in studies in Japan Telework Society**

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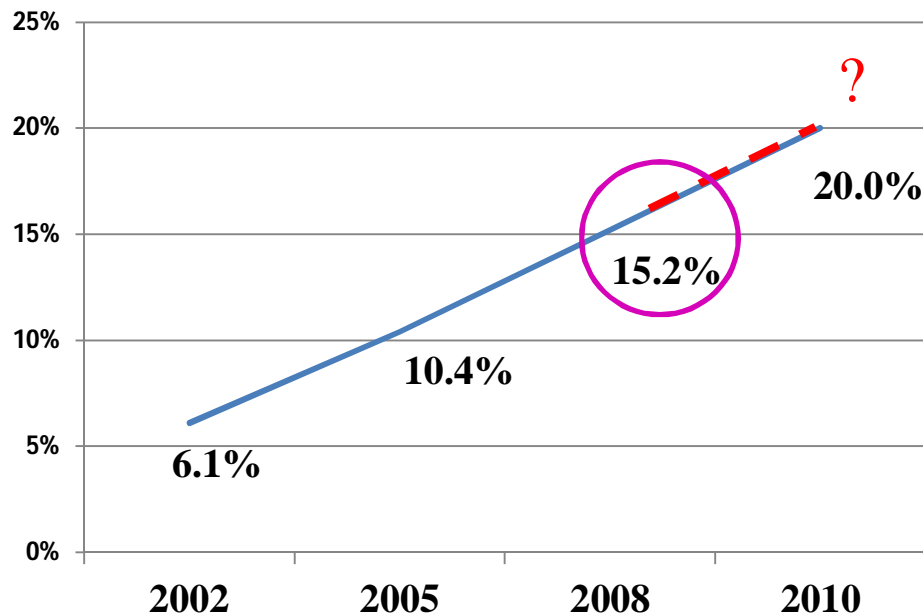
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**As of 2008 15.2 % of Japanese workers are teleworking more than 8 hours a week.**



(The Ministry of Land, Infrastructure and Transport)

**Telework rate is projected to reach over 20% in 2010 in Japan**

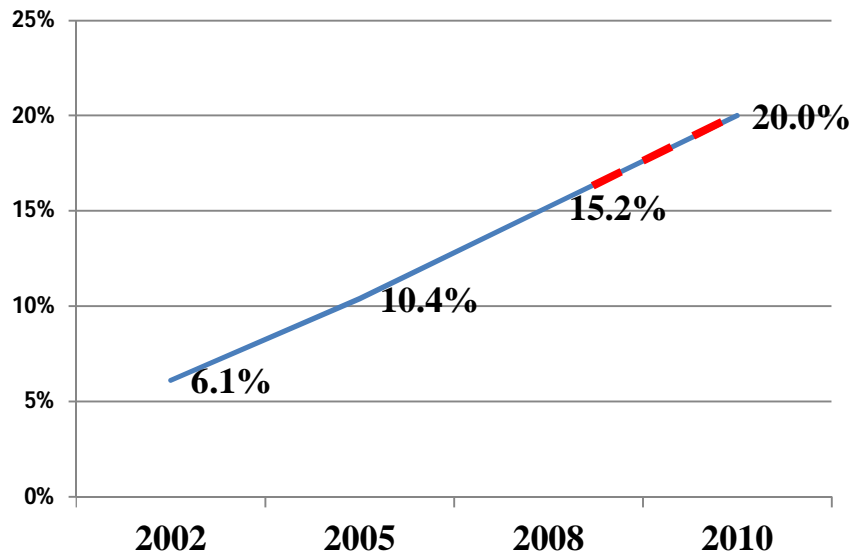
## Definition of teleworkers

**Teleworkers are people who**

- A. earn revenue from their regular jobs,**
- B. work with IT tools,**
- C. have more than one work places or one work place outside their company's office which are equipped with IT tools,**
- D. are working more than 8 hours a week at work place outside their company's office.**

**This definition is controversial though it is widely accepted in Japan.**

## Telework rates in Japan



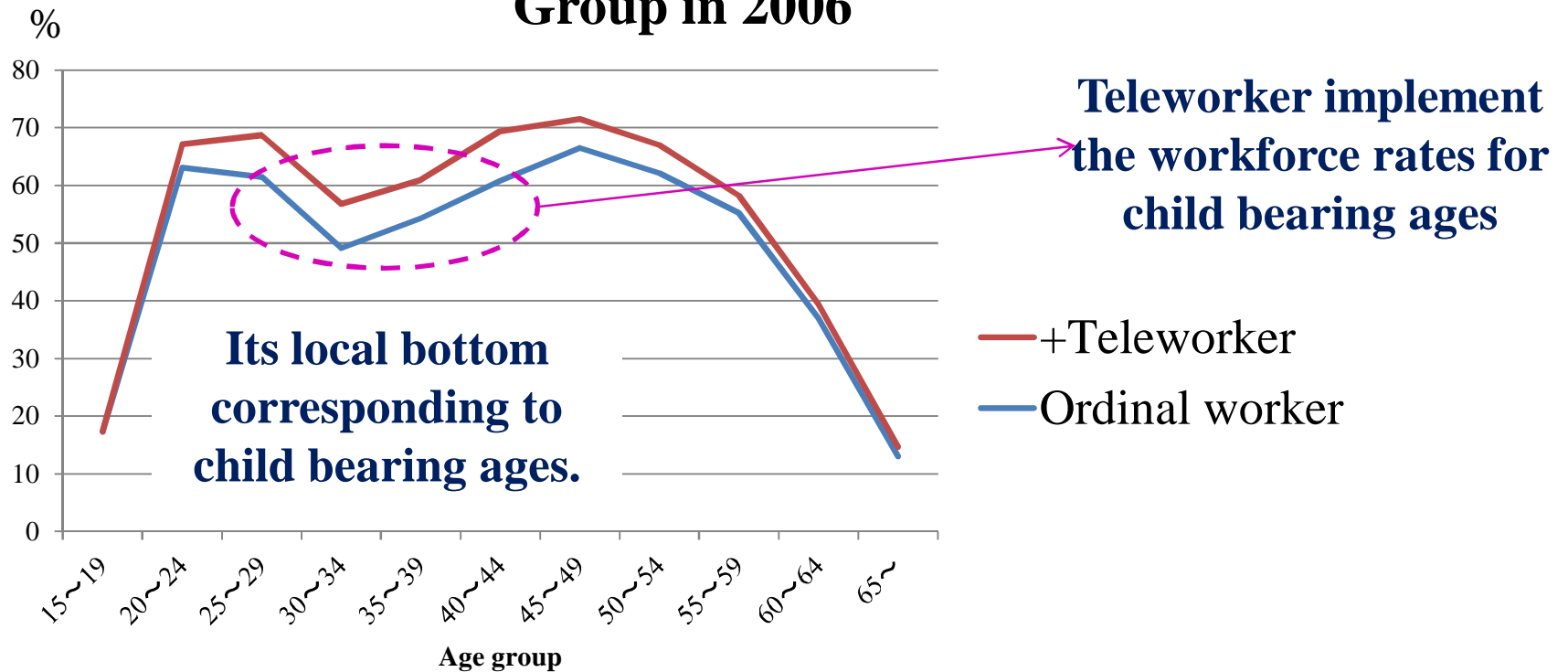
(The Ministry of Land, Infrastructure and Transport)

## Telework rates in EU in 2002

Austria	13.8	Luxemburg	5.6
Belgium	10.6	Netherlands	26.4
Danmark	21.5	Portugal	3.4
Finland	21.8	Spain	4.9
France	6.3	Sweden	18.7
Germany	16.6	UK	17.3
Greece	11.1	EU(15)	13
Ireland	10.9	Switzerland	16.8
Italy	9.5	US	24.6

**Japan is becoming a developed country for telework 10 years behind those leading countries.**

## Japanese Female Workforce Rate by Age Group in 2006



**Telework is promoting the woman's participation in society or business.**

## Japan Telework Society since 1999

- (i) Reviews of the effectiveness of Telework
- (ii) Surveys on actual conditions of Teleworkers
- (iii) Case studies
- (iv) New business models
- (v) Issues and resolutions in the business by Teleworkers.

A wide variety  
of issues are  
discussed in  
their journal.

The issues discussed in the journal reflect the actual aspect of the telework in Japan



Our aim in this study is to figure out the trends in issues discussed in the Journal of Japan Telework Society proposing a new procedure for analyzing articles in academic journals.

**(I) Keyword extraction using the language morphological analysis method**

**(II) Keyword Selection based on frequency**



**New idea**

**by considering the features of Japanese way of academic writing.**

**Three conditions:**

- (a) They are included in (the) sentence which includes the phrase "in this article" or "in this study" or "in this paper"**
- (b) They are nouns conjunctive to verbs, that is, nouns used like "do+something".**
- (c) They do not locate after negative conjunctions in sentences.**

**(Let me omit to explain the details as difficulty due to limited time.)**

**After those steps the following keywords are selected.**

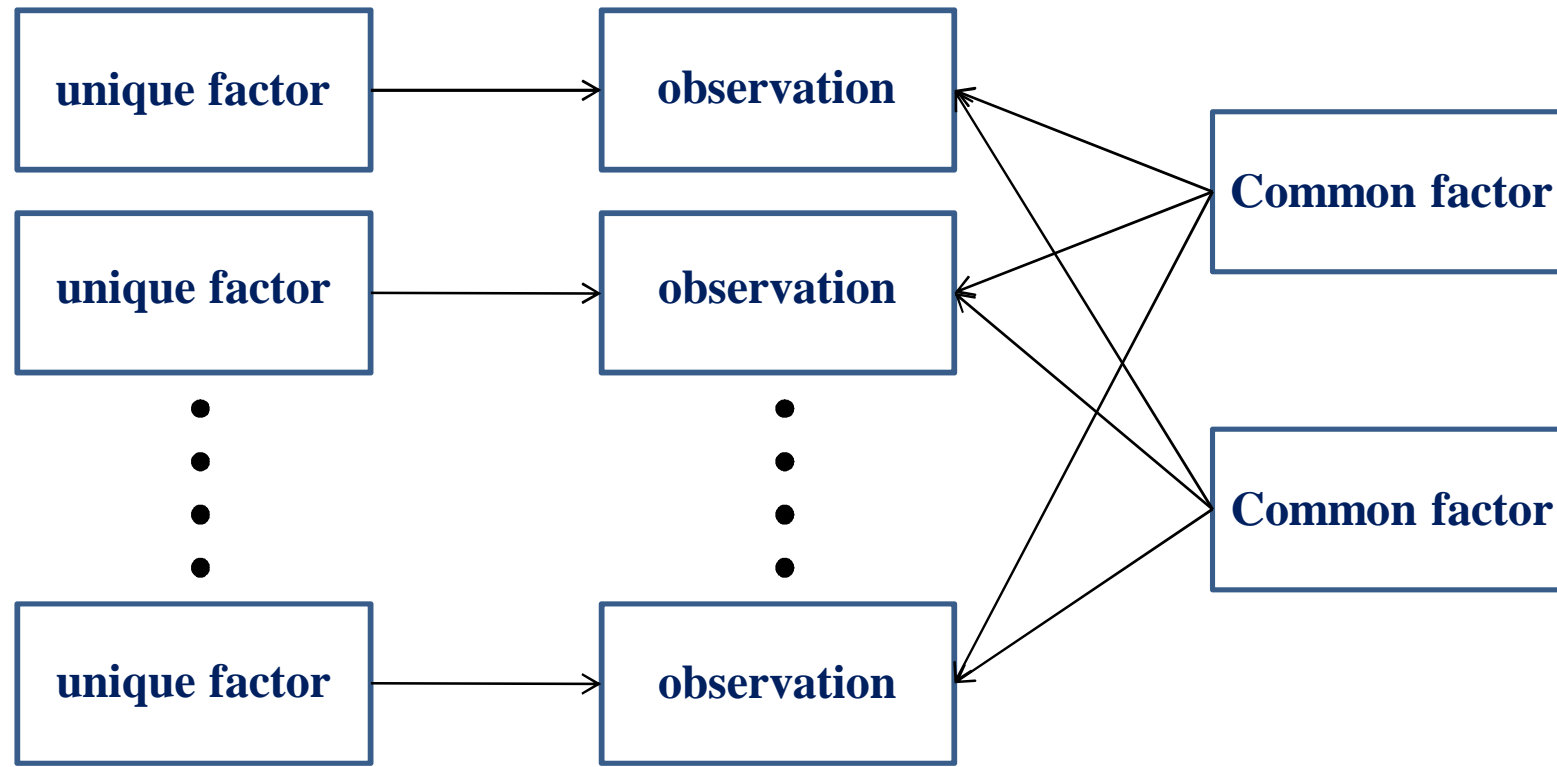
survey	research	discussion
introduction	implementation	relation
organization	definition	induction
conformation	in existence	at home
proposal	comparison	analysis
review	consciousness	take root

 **(Keyword, article)-table**

	survey	research	discussion	analysis	introduction	implementation
Toward Telework Adoption Methodology for Japanese Organizations : Case-based Approach	1	1	0	0	1	1
A Research of Impeding Elements on Taking Root of Telework into Japanese Enterprises	1	1	0	1	0	0
An Analytical Model of Telework Centre Development Patterns : UK Case Studies	1	0	0	0	0	0

### (III) Factor analysis of (article, keyword)-table

Factor analysis is a statistical method used to describe observed variables in terms of linear combinations of a fewer number of unobserved common factors plus unique factor terms.



**(III) Factor analysis of (article, keyword)-table**

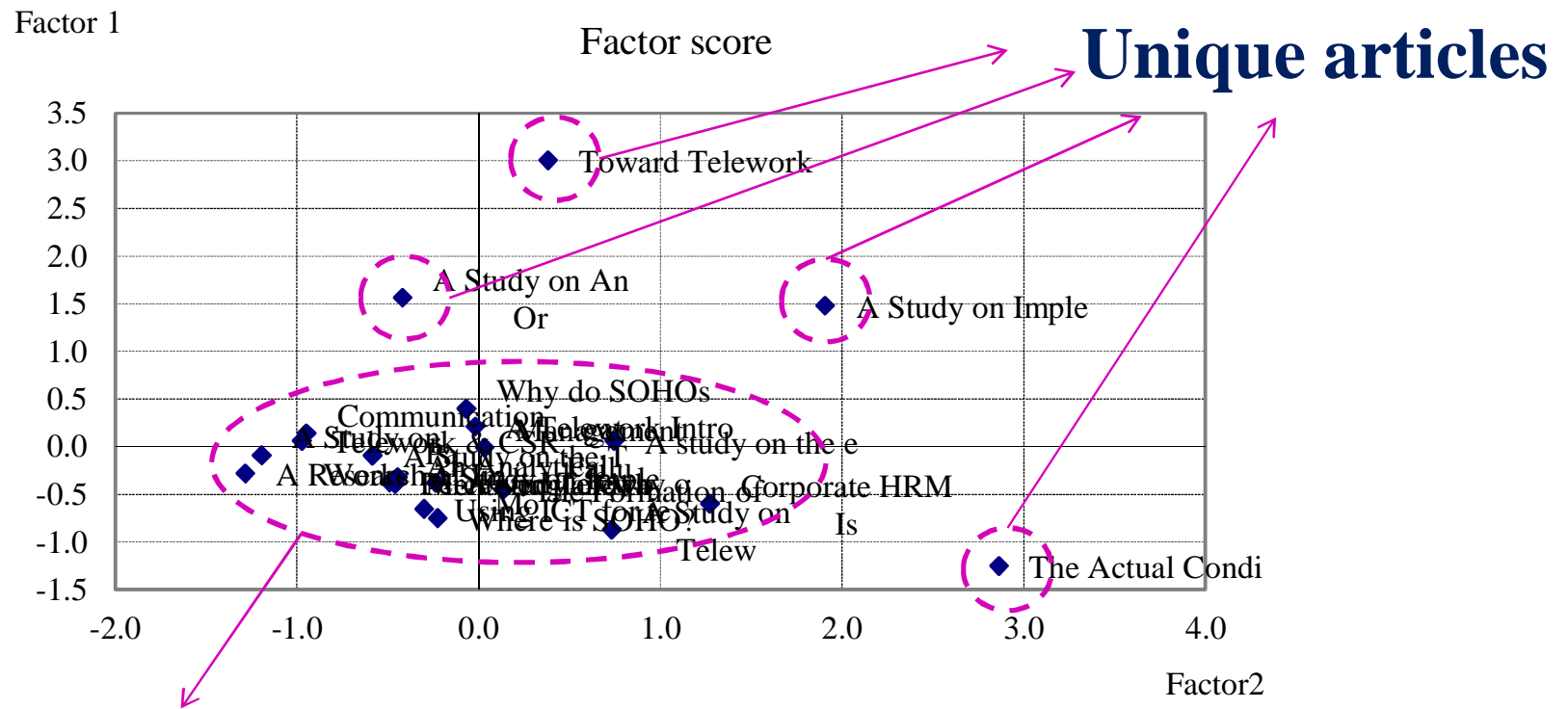
Eigen Values (rotated)

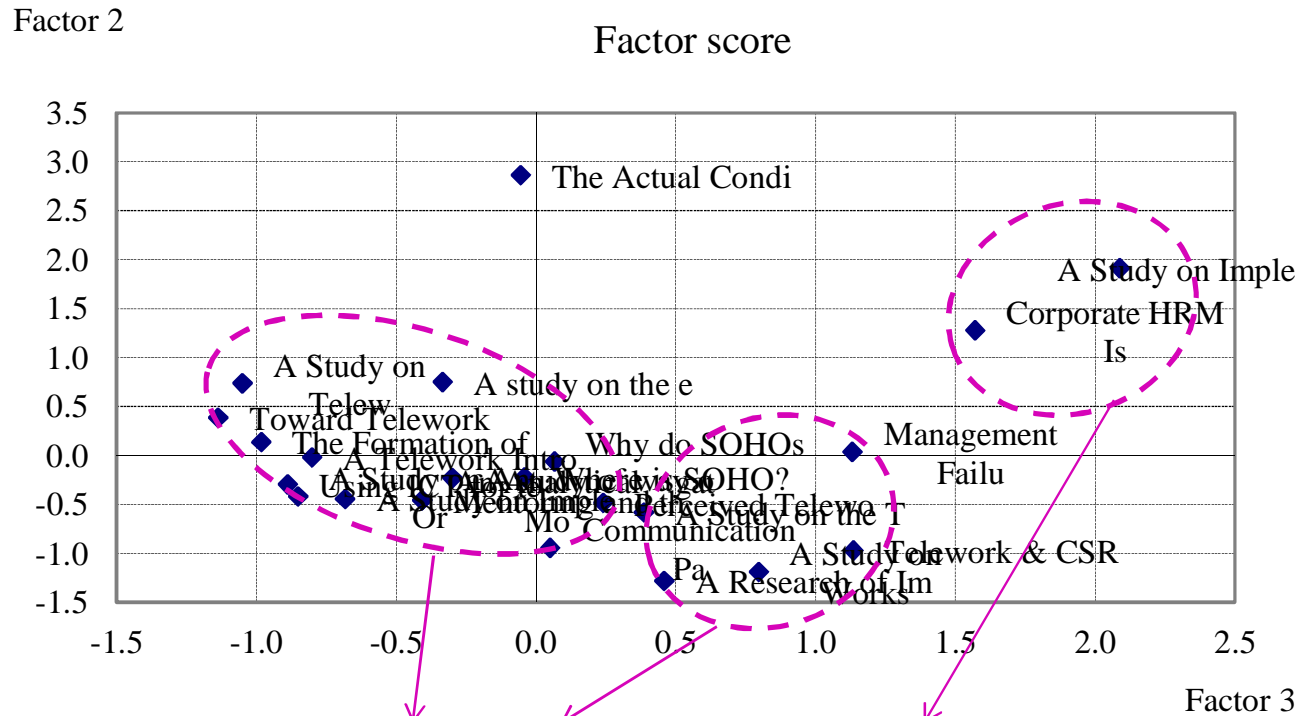
Factor	Eigen Value	Contribution Rate (%)	Cumulative (%)
1	2.49	13.85	13.85
2	2.08	11.56	25.40
3	1.70	9.46	34.86

Factor loading (rotated)

	Factor 1	Factor 2	Factor 3
organization	<b>0.76</b>	0.21	0.02
proposal	<b>0.63</b>	-0.01	-0.37
in existence	<b>0.59</b>	0.31	0.28
introduction	<b>0.54</b>	0.27	0.02
at home	-0.05	<b>0.80</b>	0.48
definition	0.33	<b>0.62</b>	-0.01
relation	0.10	0.12	<b>0.66</b>
analysis	0.16	-0.18	<b>0.51</b>

We can /may grasp overall similar relationship by plotting the articles on factor coordinate system.



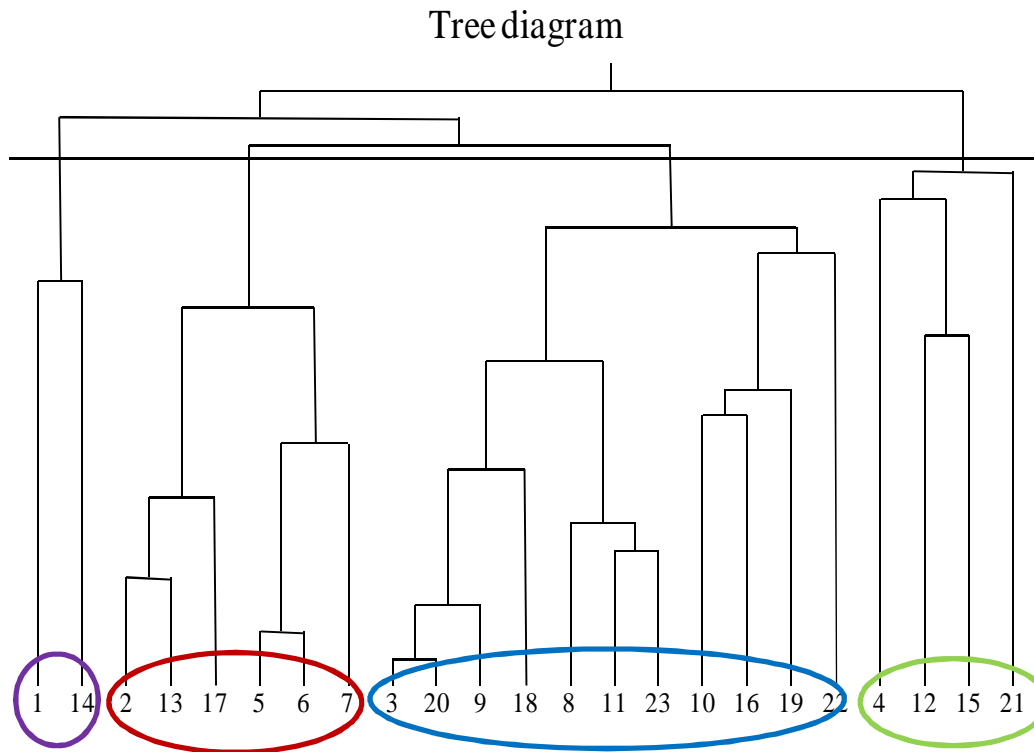


**Can those be assigned to different group?**



**We can't grasp overall similar relationship among articles precisely because of its complicity.**

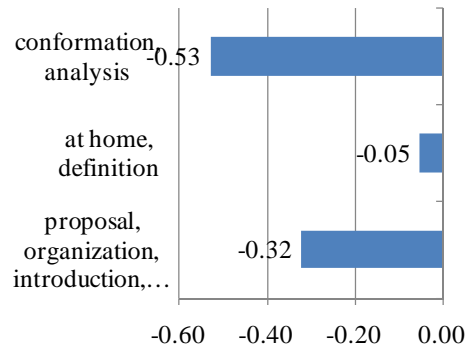
## (IV) Cluster analysis based on factor scores



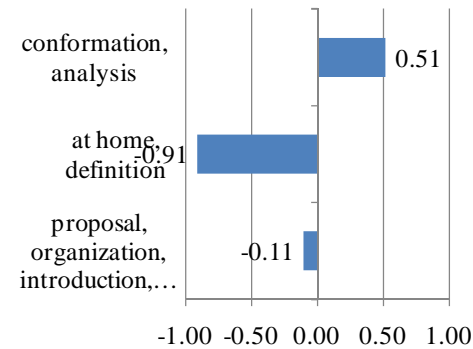
➔ The articles in the journal have been finally assigned into 4 clusters.

**Observations, that is, articles are hierarchically assigned into clusters in terms of their similarity.**

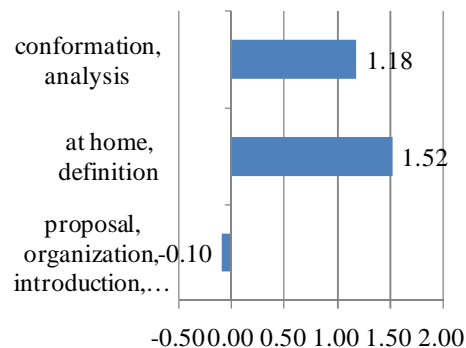
**Those 4 clusters are interpreted based on the average values of factor score.**



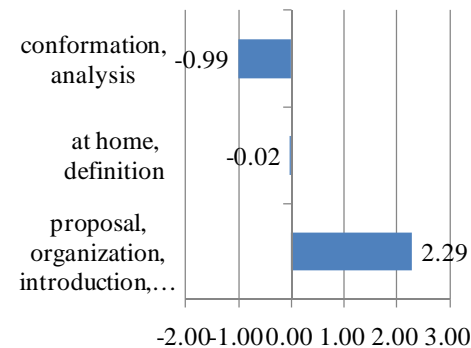
**Ordinary  
Telework  
study**



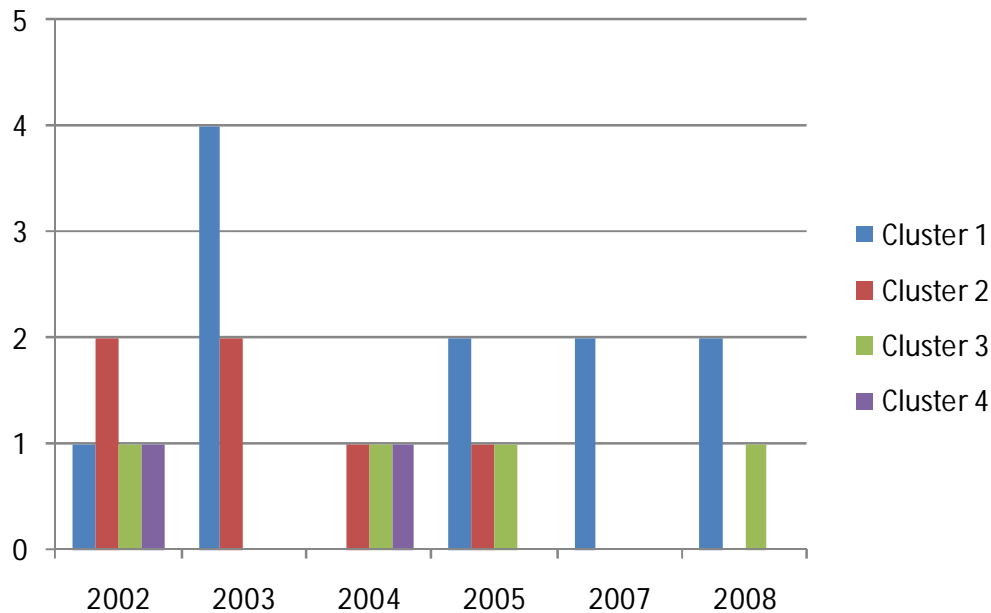
**Confirmation by  
survey or  
interview without  
the definition of  
Telework**



**Confirmation  
by survey or  
interview with  
the definition of  
Telework**



**Proposal or  
introduction of  
Telework to  
organizations in  
existence**



**Cluster 1: Ordinary Telework study**

**Cluster 2: Confirmation by survey or interview without the definition of telework**

**Cluster 3: Confirmation by survey or interview with the definition of telework**

**Cluster 4: Proposal or introduction of Telework to organizations in existence**

The numbers of articles in **Cluster 2** and **Cluster 4** are decreasing.



Telework in Japan has departed from the phase where it is simply proposed or introduced without rigorous discussions.

- [1] Spinks, W. A. *Japanese way of management and satellite office in enterprise: Josai International University Institute of Inter-Cultural Research.*
- [2] Feldman, R. and Sanger, J. *The Text Mining Handbook*, Cambridge University Press.
- [3] Yoshimura K., Hitaka T. and Yoshida S. *Morphological Analysis of Non-marked-off Japanese Sentences by the Least BUNSETSU's Number Method: Journal of information processing.* Vol. 24, No. 1, (1983) pp. 40-46 (in Japanese).
- [4] Yukawa, M. and Okano, M. *An analysis of responses of audiences to TV commercial messages. Bulletin of Bunkyo junior college.* Vol. 48, (2005), pp. 1-6 (in Japanese).
- [5] Zwicky, F. and Wilson A. (eds.) *New Methods of Thought and Procedure: Contributions to the Symposium on Methodologies*, Berlin: Springer 1967.
- [6] Uno, S. and Suzuki, J. *An Information & Communication Environment in an Office and CTI : The Result of the Resarch on CTI: the Journal of the Institute of Electronic, Information and Communication Engineers.* Vol. 97 (1997), pp. 55-62 (in Japanese).