Physical Environment of Connecticut State Government Teleworkers

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Abstract

This paper describes the very first effort to examine and verify teleworkers' current physical environment in smaller scales and in broader aspects that have been neglected in existing studies. Through person-to-person and written surveys with Connecticut state government teleworkers, some significances of their physical environment were verified; In smaller scale of municipalities, they live significantly closer to the centers of their towns than national average, while in large scale, they clearly tend to live either in suburbs or in country side than in urban area. After they started telework, their neighborhood reliance in shopping and in service use noticeably increased shrinking the share of down town. Their houses are no larger than the average houses in the area, yet with their household size, majority of them can afford independent offices or large enough space to accommodate dedicated office space. At the same time, formal office, both as a room and as furniture setting, is not always desired. Some of these tendencies also found to correlate with their work-life factors such as telework frequency, their motivation to telework or their new way of time use.

Keywords: telework; labor and city; home-office; United States

1. Introduction

Telework, along with telecommunication technology which enables it, has recently been a relatively popular subject for scholars and critics, due to the steady increase of telework population reported. Although their focuses of discussion tend to be on its social consequence, they also refer to its possible effect on physical urban conditions and started to forecast that cities/ environments might be transformed in wide range of scale and aspects although mostly based on their casual observation.

In national and regional scale, population distribution, transportation system, land use and air quality are said to be changed according to them. On-going argument between population decentralization predicted by many (e.g. Gilder[1], Gorden and Richardson[2]) and ever-increasing importance of urban places claimed by Kotokin[3], Graham and Marvin[4] is just one of the examples. In smaller scale of community and housing, the preferable size and facilities of towns are said to be changed into "concentrated cities decentralized"[5] condition, zoning definition will be adjusted to accommodate business into single family zones[6], "smart house" with high-tech design will emerge[7] to change the typical floor plan of houses, and home-centerdness is forecasted to be increased.[8),9)].

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Considering this variety of predicted effect that telework and telecommunication might have on the physical environment, however, it is almost surprising that only two aspects, transportation and population both of them in large scale, have been covered by empirical and statistical studies to be tested on current condition. Impact of telework on reduction of vehicle-miles traveled and travel behavior was analyzed[10], empirically calculated by many[11),12),13)]and equilibrium model in decision making to choose telework was presented[14]. As for population distribution again in large scale, an equilibrium model suggested that telework changes the residential location farther from the work-place[15], while some of the above critics' presumption of population decentralization was found to have no proof in current demographics.[16] Other environmental aspects especially in smaller scale, though often discussed in transformation prediction, remain not to be testified so far.

2. The Scheme and the Purpose

This paper describes the very first effort to depict these unseen aspects of physical environments around teleworkers especially in smaller scale. This cannot be achieved by using common demographics such as census, and we consider that there are basically two ways of approach. First is the place-oriented approach, in which some places with high density of teleworkers be chosen as subjects, their current land-use, facilities, infrastructure and housing condition be researched, and if any changes occurred be analyzed. With this scheme, current physical conditions of specific place and their recent transformation, if there is any, could be shown in detail, however, if and how those conditions ever relate

to the teleworkers are very difficult to verify.

Second is what we call a people-oriented approach, in which a group of teleworkers be chosen as subjects, and the residential location, the use of facilities/ infrastructure and the housing condition of each teleworkers be researched. With this scheme, condition and transformation of particular area's environment cannot be shown due to the scattered existence of teleworkers. However, the characteristics/propensity of their regional and residential environments, how they live in there, and how those conditions associate with telework will be seen in this approach, all under the specific work-life style condition of telework. In this sense, this approach is not to testify each of possible transformation directly, but to verify the force or vector of teleworker's current environment which could form a new condition, if not transformation, collectively in the long term.

In this paper, given the valuable chance to contact many of Connecticut state government teleworkers, we took this second scheme; the people oriented one, in pursuit of making the very first step to examine and verify current physical environment of teleworkers in smaller scale and in broader aspects that have been neglected. To achieve this purpose, focus of this study is set to clarify the followings of Connecticut state teleworkers' environment;

- Their residential location in smaller scale of municipalities as well as in large scale
- Their relationship to their community /neighborhood in the form of use of and reliance on facilities/services in the area
- Their residential environment including size of their houses, home-office location in the house, and its exclusivity for work.

First and third should be self-explanatory, yet second one was set because that will be an important material to see the allocation and size of each land-use /zoning of their towns.

In order to see the association of these focused physical environments with telework as work-life style, we also researched and gave analysis on their motivation to telework and their new way of time use as well as their digital environment as background. In the following sections, after we explain the survey method (Section 3) and research subjects (Section 4), these related aspects will be discussed first (Section5-1,2) followed by the results in the focus (5-3,4,5).

3. Survey Method

This research is based on 63 survey data out of 218 CT government teleworkers as of December 2002. Among them, 19 are face-to-face interviews, 2 are telephone interviews and 41 are in the format of written surveys. All interviews were conducted form January to February of 2003 as voluntary basis. We met 17 of them individually in their offices, and visited home-offices of 2 teleworkers. Written surveys were sent out to the remaining 196 teleworkers in February, 2003, and 41 responded as of April, 2003.

Questionnaire entries are same in interviews and written survey except for some minor adjustments of sentences in written one to make them more precise. At the interviews, which took half an hour per person on average, some extra information was derived from the interviewees in our effort to understand their working conditions and daily lives which, we hoped, would contribute to the accuracy of our analysis. 18 interviewees offered us photos of their towns, homes and home-offices, which also assisted us to know their physical environment.

In analyzing the result of survey, chi-square tests were performed with percentage of risk at 5%, when any correlation or comparison between the data is necessary to be tested.

4. Research Subjects

The CT government defines telework as "a voluntary employment alternative" that avoids the normal work commute and offers the choice of working at home...primarily on a part-time basis[17]". Its program guideline states that telework is a management option not an employee entitlement[18], although it does not deny that it may facilitate the employee meeting family responsibilities[19].

Table 1 shows demographic and occupational characteristics of CT state teleworkers. In comparison with Connecticut labors in general, CT state teleworkers are older with its mean age in 40's, have higher ratio of female and have considerably higher income.

By comparing its data with U.S. teleworkers in general, we could see that CT state teleworkers represent mainstream of U.S. teleworkers in its occupational character. More than half of teleworkers in U.S. are in professional and managerial occupation, and more than 70% are the employees, both of which are all CT state teleworkers' working states. This means that the result of this research stands for the situation of U.S. teleworkers in general to a large extent, although there are some elements only seen in CT state teleworkers such as lack of younger generation, higher ratio of female and non-existence of other occupation and industries, for which careful consideration be taken.

Average length of telework experience among CT government teleworkers is 2.08 years with longest experience of 5 years (Table 2). This average number, we judge, is long enough for them to recognize the influences of telework on their life and environment, and hence to make the results of this research valid for the analysis.

On the other hand, their telework frequency per week is not very high in comparison with US teleworkers. 43% of them telework once a week, and 27 % telework less than once a week (Table 2).[1] In order to clearly see the influence of telework on research results, we also took statistics for those who telework twice a week[2] or more

which consist of 29% of whole CT teleworkers, whom we call "frequent teleworkers" hereafter, on some of the items of the survey.

Table 1. Background of CT state teleworkers

		U.S. Teleworkers*	CT State Teleworkers**	CT Labors***
Age		25-34 23.4%	20's 0.0%	25-34 20.9%
		35-44 31.5%	30's 30.0%	35-44 27.7%
		45-54 21.8%	40's 43.0%	45-54 22.9%
		55-64 13.3%	50's 21.0%	55-64 11.5%
Gender	Male	54.4%	43.0%	52.2%
	Female	45.6%	57.0%	47.7%
Race	Caucasian	76.2%	75.0%	80.2%
	AfricanAmerica	9.3%	15.0%	7.8%
	Hispanic	5.6%	7.0%	7.6%
Median Annual Income		$40,000	$57,000	FulltimeM $45,787
				FulltimeF $33,318
Household Size		-	2.84	2.53
Employment	Employee	71.4%	100.0%	87.9%
	Self Employed	28.7%	0.0%	6.1%
Occupation (distribution ratio-top3)	Proffesional, Managerial	50.6%	100.0%	36.9%
	Technical	8.5%	-	
	Sales	10.9%	-	incld.service 24.9%
Industry (ditto)	Service excld. public admini.	13.9%	-	4.2%
	Public Admini.	3.3%	100.0%	3.8%
	Health care & social assist.	12.2%	-	incld.educat. 20.7%
	Construction	10.6%	-	5.6%

*Davis & Polonko(2001), "Telework in the United States: Teleowork America Survey 2001". Telework frequency is only for home-teleworkers.
**Race distribution and income are for the whole CT governmnet employees
***Connecticut Department of Economics and Community Development (2000), "Connecticut State Census Profile 2000"

Table 2. Telework Condition

		U.S. Teleworker	CT State Teleworkers	CT Labors***
Average Commute Time		33.1min.	40.24min	24.4 min.
Telework Frequency per week	less	4.8%	27.0%	
	1	12.9%	43.0%	
	2	17.7%	17.0%	
	3	9.7%	3.0%	
	4	6.5%	0.0%	
	5	35.5%	9.0%	
Average years of twrk		3.00	2.08	

5. Results

5.1 Time Use and Telework Motivation

Teleworkers' commute time, office hour change, allocation of time formally spent for commuting and their motivation to telework were asked and cross examined here, because time use and decision making process for it are important elements of life style that eventually define their choice of or attitude to their physical environment.

CT state teleworkers drive to work for long hours with the average commute time of 40.24 minutes (Table 2). This is more than 1.6 times of the average of CT laborers and more than 1.2 times of that of U.S. teleworkers. There are 30 of them commuting for more than 45 minutes whom we call "long commuters". Distribution of commute time of frequent teleworkers does not differ significantly to the data of the body, which means that longer commute does not necessarily force or help them to telework more (Table 3).

Motivation to start telework was asked in open-ended question, 18 most repeated phrases were picked up and their appearances were count, then sorted into 9 small, 5 large categories. This allows multiple choices of factors by one teleworker as a result. Unlike rather common understanding that people telework for their home-boundness, here work factors, such as increased efficiency of or better concentration on works, predominates others followed by time factors as in Table 4. Factors related to comfort and to home-boundness are less common, although more than 10% of teleworkers are motivated by these at least partially. Quietness seemed to be a keyword combining work and comfort factors and possibly related to teleworkers' environment. Many wrote and repeatedly mentioned at the interviews that they can work efficiently because of the quietness, and feel comfortable working at home because it is quieter than main office.

Long commute time does not differs answer distribution of motivation factors, which suggests that commute related time factors could be secondary to others even when they are chosen. Frequent telework, on the other hand, significantly differs it; they are much more motivated by home-boundness especially medical reasons, much less so by work factors. These two imply that majority of CT state teleworkers who only telework once a week or less choose to do so mainly for the work efficiency while frequent teleworkers, who are about one fourth of the whole body, needed to do so due to their home-boundness.

While work-related factors are emphasized as motivation for telework, at least one benefit of it, the time they gain by not commuting goes more to their personal life. Being with family, taking rest and athletic activities are three most ways of using this extra time, and this ratio is not different in case of frequent teleworkers (Table 5). The difference of motivation to telework does not affect their new way of using time, neither. We compare the time use of those who only choose work factors as motivation (stated as "solely work motivated" in the table) with that of the whole body to find out that this family-individual oriented time use is consistent there.

As for office hour, on days of telework, more than 60% of them start to work earlier than they do in the main office, some as early as 5 or 6 o'clock in the morning, which indicates that they try to have substantial amount of time in the afternoon for their own personal use.

5.2 Digital Environment

As seen in Fig.1, CT state teleworkers are fairy well equipped with computers, at least as much as whole U.S. teleworkers researched by ITAC[20)3]. However, as for internet accesses, their broadband access and LAN access to the main office are lower than national numbers and it is almost surprising to see that more than one forth of CT government teleworkers have no internet accesses at home (Fig.2). Telephone equipments do not look very sufficient either. Ratio of possession of business phone line, mobile phone and fax machine are lower than ITAC research (Fig.3). Usage rate of voice mail[4] at main offices is as high as 71%, which indicate that voice mail is

Table 3. Commute Time

	N	Commute Time				
		~29min	30min	45min	1h	1.5h
All teleworkers	63	13	20	16	8	6
%		20.63	31.75	25.40	12.70	9.52
Frequent Teleworkers	18	2	7	6	2	1
%		11.11	38.89	33.33	11.11	5.56
		Non significant distributin difference (p=0.76)				

Table 5. Allocation of Time used to spent for commuting

	total # of answers chosen	Be with family	Take rest	Athelet ics	Errands /house work	Readin g/paper	Work more	Be in nature	Volunt eer	Hobbie s	See friends	Distribution Difference to All Teleworkers	p
All Teleworkers	108	31	26	19	12	6	6	3	2	2	1		
answer distribition %		28.7	24.1	17.6	11.1	5.6	5.6	2.8	1.9	1.9	0.9		
% to all teleworkers		49.2	41.3	30.2	19.0	9.5	9.5	4.8	3.2	3.2	1.6		
Frequent Teleworkers	26	8	9	3	2	2	1	1	0	0	0	Non	
answer distribition %		30.8	34.6	11.5	7.7	7.7	3.8	3.8	0.0	0.0	0.0	Significant	0.92>0.05
Solely Work-motivated	20	7	4	5	1	1	1	1	0	0	0	Non	
answer distribition %		35.0	20.0	25.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	Significant	0.93>0.05

*Key words given but not chosen are going to school/lessons, taking second job and going to movie/musum/theaters.
**Other motivation categorizations, such as soley home-bound, show no significant difference, neighther.

Table 4. Motivation to start telework

	No. of keywords appeared	TIME		WORK		COMFORT	SOCIAL	HOME-BOUNDNESS			Distribution Deference toAll Teleworkers	p
		Time Factors exclud. Commute Related*	Commute Related Time Factors	Work Factors exclud. Quietness **	Quietness	Comfort Factors exclud. Quietness ***	Environmental Factor	Convinience	Family Factors	Medical Reasons		
All Teleworkers	120	19	20	39	10	8	2	3	10	9		
answer distribition %		15.8	16.7	32.5	8.3	6.7	1.7	2.5	8.3	7.5		
% to all teleworkers		30.2	31.7	61.9	15.9	12.7	3.2	4.8	15.9	14.3		
Frequent Teleworkers	30	3	7	5	1	5	1	0	2	6		
answer distribition %		10.0	23.3	16.7	3.3	16.7	3.3	0.0	6.7	20.0	**Significant**	0.03<0.05
Long Commuters	63	13	13	20	6	3	1	1	4	2		
answer distribition %		20.6	20.6	31.7	9.5	4.8	1.6	1.6	6.3	3.2	N.S.	0.85>0.05

*Save time, prefer flexibility
**have work be done at home, work efficiency, no interaption, good concentration
*** easy/no dress up, comfortable, relaz, no bad weather, longer sleep

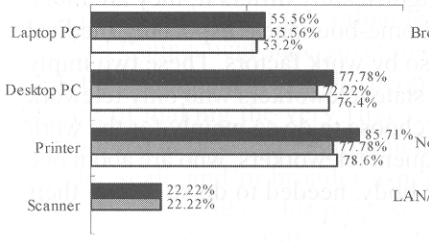

Fig.1. Digital Equipments

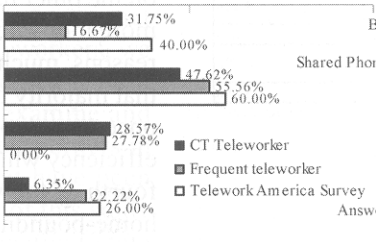

Fig.2. Internet Access

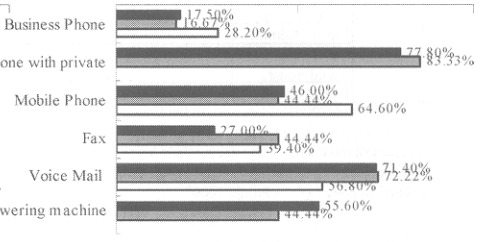

Fig.3. Phone Equipments

covering up the lack of connectivity with main office or with people from outside to some degree. More than half of them have answering machine at home, but they do not use it for business, which we gathered through interviews.

As the result of these conditions, their degree of satisfaction to their digital environment, which is 65%, is relatively lower than their satisfaction rate to regional or residential environment. Their image of what is lacking is also clearer here; most of those who are not satisfied stated that they need better connectivity.

5.3 Residential location in large and small scales

Great majority, 93%, of CT government teleworkers live outside of urban area, among which the ratio of "suburb" and "rural" are equal (Table 6). This residential distribution in large scale is significantly different from that of all CT population with much less urban residents and far more rural ones. This rural tendency is farther intensified in case of frequent teleworkers with more than 80% of rural residents. Since frequent teleworkers do not necessarily commute long as already mentioned, it could be said that frequent teleworkers live not necessarily far from the main office but certainly in rural settings.

In smaller scale of municipality, the average distance from their residence to the center of the town is 2.62 miles (Table 7). This is only one-fifth of average travel distance that Americans make for grocery shopping and one-third of that for going to public places such as town hall or library, which makes it reliable to say that CT state teleworkers live very close to the core of their towns of residence.

Somewhat surprisingly, neither the difference of motivation to start telework nor that of new way of time use vary the residential distribution in large scale (Table 8). There was no visible proof that those who seek comfort live more likely in rural setting or those who care for time live more in urban areas.

However, in smaller scale, residential distribution differs depending on motivation and time use (Table 9). As for motivation, although the difference is not significant between the body and those who chose each factor, when we compare the distribution between those who chose each factor, there were clear differences. Time-seeking teleworkers and work-motivated tend to live farther from town centers of their residence than home-bounded ones. Concerning new way of time use, those who do errands or house work for the extra time they gained live more likely within 1 mile from town center; the difference is almost significant with p=0.06.

5.4 Location choice for shopping and service use

Teleworkers' choices of location for shopping and using private/public services were asked here to see their relationship with their community/ neighborhood, especially if and how their neighborhood reliance and/ or internet reliance went up before and after telework.

Types of shopping researched here were grocery, cloth, book and gift shopping and eating out at restaurants. As for using services, ten common activities were chosen; banking, postal service, museum/theater visit, consulting