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

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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. Gilder¹¹, Gorden and Richardson¹²) and ever-increasing importance of urban places claimed by Kotokin¹³, Graham and Marvin¹⁴ 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”¹⁵ condition, zoning definition will be adjusted to accommodate business into single family zones¹⁶, “smart house” with high-tech design will emerge¹⁷ to change the typical floor plan of houses, and home-centeredness is forecasted to be increased.¹⁸¹⁹

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 analyzed¹⁰, empirically calculated by many¹¹,¹²,¹³ and equilibrium model in decision making to choose telework was presented¹⁴. As for population distribution again in large scale, an equilibrium model suggested that telework changes the residential location farther from the work-place¹⁵, while some of the above critics’ presumption of population decentralization was found to have no proof in current demographics.¹⁰ 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 (Section 5-1,2) 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 from 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
different. Its program guideline states that telework is a management option not an employee entitlement, although it does not deny that it may facilitate the employee meeting family responsibilities.

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). In order to clearly see the influence of telework on research results, we also took statistics for those who telework twice a week 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 Laborers*** |
| Age                                     | 25-34 | 24.5% | 25-34 | 20.9% | 25-34 | 20.9% |
|                                         | 55-64 | 31.5% | 55-64 | 30.6% | 55-64 | 27.7% |
| Gender                                   | Male  | 54.4% | Female | 45.6% | 54.5% | 52.2% |
|                                         | 55-64 | 46.0% | 55-64 | 37.0% | 55-64 | 47.2% |
| Race                                     | Caucasian | 78.2% | African American | 9.3% | Hispanic | 5.0% |
|                                         | 55-64 | 75.0% | 55-64 | 15.0% | 55-64 | 7.8% |
|                                         |       |       |       |       |       |       |
| Median Annual Income                     | $40,000 | $57,000 | Fulltime | $45,787 | $54,978 | $33,318 |

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 lifestyle 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 differ 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 fairly well equipped with computers, at least as much as whole U.S. teleworkers researched by ITAC20. 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 at main offices is as high at 71%, which indicate that voice mail is
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
attorney and medical doctor, taking classes, volunteering, daycare service, tax paying and in addition, seeing friends which might not be called as service use but an important social activity.

As shown in Table 10, distribution of shopping location choices in all significantly changed after they started telework. Both neighborhood reliance and internet reliance went up shrinking the share for downtown and mall shopping. It is a little surprise that distribution change for frequent teleworkers was not significant although the direction of change is consistent.

In case of service uses, distribution of location choices in all significantly changed again, yet this time, only neighborhood reliance increased having less activity in downtown and on internet (Table 11). Distribution for frequent teleworkers is also significant in this case, yet interestingly, both neighborhood and internet reliance increased here.

In order to see if any specific characteristic of teleworkers co-relate with this location change tendency, we picked up those who changed the location for at least one type of shopping or service use, and analyzed their background such as gender, age, their residential location (both in large and small scale), motivation, time use, and digital environment in comparison with those of the main body (Table 12). In background, only the gender ratio of shopping location changers is significantly different from the body having 81% as female.

For residential location in large scale, there is no significant indication that those who live in countryside change locations more than those in the city. However, since the main body has strong propensity toward rural area, we should not generalize this to say that neighborhood reliance and internet reliance in large scale does not correlate at all. On the other hand, residential location in small scale shows some, if not exactly significant, correlation with the neighborhood reliance. Those who live nearer to town center has stronger tendency to change shopping location than others after they started telework.

While time use and digital environment do not correlate with location change, the motivation to start telework, especially home-boundness has association with location change. Teleworkers who are home-bound changed shopping locations significantly more than those who are not.

Although the overall direction of change is fairly consistent for all teleworkers as the above, not all kinds of shopping and service use locations changed in the exact same way and same degree. As for shopping, the proportion of those who changed eating out location is much lower than for other kinds of shopping (Fig.4). Internet reliance went up for cloth, books and gift shopping but not for grocery (Table 13). Concerning service use, banking and postal services have higher rate of changing location than others, while that for consulting attorney, medical doctors and daycare services are relatively low (Fig.5). Only two cases that we saw the internet increases are banking and tax filing (Table 14). It is not difficult to believe that these difference occur depending on frequencies of activities (ie; we go to post office more often that law offices), on if those activities could be easily done on internet such as buying books, and on the extent to which the personal relationship are important for the activities.

It is also noticeable that for every shopping and service activities, proportion of frequent teleworkers who changed location is almost twice as high as the ones for all in many cases, which indicates telework frequency affects the degree of change in their habits.

Related to this increase of neighborhood reliance is satisfaction to the facilities in their towns. It is high among CT government teleworkers. Almost 70% say...
nothing they want is missing in their towns. At the time of the interviews, even when they gave us some additional desirable facilities, many said “There is really nothing missing, but since you ask, it will not hurt to have this and this” Some mentioned facilities here are athletic ones, restaurants and shops all by less than 10% teleworkers.

5.5 Residential Environment

5.5.1 Homes and home-Offices

Homes of CT state teleworkers are no larger than owner-occupied houses in CT. Distribution of number of bed rooms that teleworkers have are not significantly different from the state wide data, although we see that teleworkers tend to have more 4BR houses than the others (Table 15). For frequent teleworkers, we did not see significant difference from state-wide data, neither, and in comparison with all CT teleworkers, they actually have less number of 4BR houses and more 3 BR ones. Average number of bed rooms at home is 3.1 both among whole CT teleworkers and frequent teleworkers. Assuming that they have a living room, a dining and a kitchen, the average number of rooms they have is 6.1. This is slightly larger than the average of whole housing units in CT which is 5.6 rooms, yet again not significantly.

As for the office space at home, nearly 90% of CT government teleworkers have dedicated office space (Table 16). Among those, almost 60% have independent office. These ratios do not significantly changes depending on the frequency of telework.

These numbers indicate that, although not larger than average homes in CT, they have enough space to accommodate their work at home. Considering that typical household of CT state teleworkers is consisted of a pair of adults and one child which usually require 2 bed rooms and that they have 3 bed rooms in average, it is easy to imagine that one extra bed room was turned into the office. This assumption coincides with that fact
that the ratio for independent office drops significantly when their houses become smaller with 2 or less bed rooms.

When asked the former use of independent office, more than 70% of independent office holders stated that it had been a office or a study even before they started telework (Fig.6). This means that nearly half of CT state teleworkers houses were ready to accommodate office use even before they started telework.

As shown, the majority of CT state teleworkers have privilege of having large enough space at home, yet is this “fit for telework” house size or office setting very important for them? By analyzing their answers to some of our questions, we came to believe that house size means to them to some degree, but for the formal office space, we have enough facts to let us doubt the importance of it. First, the degree of satisfaction to the home does not drop when they do not have a desk for work, while it drops when they only have 2 or less bed room (Table 17). Also, furniture that CT government teleworkers have in their office space seems less than perfect than the image we have from the word “home office”; one fifth of their offices do not have a desk (Fig.7), and this ratio is consistent even for frequent teleworkers. Some mentioned working in the lounge chair with files on lap. Third, even though it is just a little more than 10%, there are people who do not have dedicated office space, and about half of them do not feel the need to have one. Three of interviewees, who are with dedicated office space, commented that they are happier in using dining table or kitchen counter for their work. By looking at discrepancy between the proportion of those with independent office (about 60%) and those who are satisfied with house (about 90%), we could visualize more are working happily with dedicated but casual office setting at home.

5.5.2 Home-office V.S. Telework center
CT government teleworkers prefer teleworking at home to using telework center.

At this present, there is no telework center for CT government, yet we asked them if they would choose to work there instead of working at home, under the hypothesis there would be a center near to their home. 86% said they would not (Fig.8), and even when they showed the preference to telework center, it was under condition that the center locates in the range of 15 minutes commuting time. This strong preference of home telework to telework center is all the way consistent for frequent teleworkers (p=0.29), for those who are not satisfied either with their town, house or home office (p=0.39~0.91), for those with smaller house (p=0.56) and for those who live far from the town core (p=0.29).

It is interesting to compare their reasons for not to choose telework center both with their motivation to telework and with their new way of time use. Although the highest ratio of teleworkers said it was because of their work, as they did for motivation question, comfort factors came very close to it this time (Table 18). In short, they started to telework at home for work efficiency, begun to use extra time gained for the family and do not want to give up comfort of it for the sake of telework center. And this implication was supported by the remarks of many interviewee; “Why should I go to telework center, when I can do everything at home?”

6. Concluding Remarks
In this paper, some significances of teleworkers’ physical environment in smaller scale and in broader aspects were verified using CT state teleworkers as case study. Founding includes the followings;
- Their residences locate significantly closer to the centers of their towns than national average.
− Their residential distribution in large scale differs significantly from that of all Connecticut residents; 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 in the rooms of other function.
− Formal office, both as a room as furniture setting, is not always desired, and comfort of the house is important advantage for home teleworkers.
− Some of the above tendencies clearly correlate with their telework frequency, their motivation to telework or their new way of time use; e.g. frequent teleworkers tend to live more in rural settings, home-bounded teleworkers tend to live closer to town centers and more likely to change shopping location than others.

This founding shows how people’s propensity, though in limited area and professions, toward regional and residential environments, is by the specific work-life style of teleworkers. To project another forecast on teleworkers’ environment or to prove the existing one directly was not the purpose of this paper. Yet, if teleworkers of similar type increase steadily in long-term, then their propensity would affect the form of our environment in the future. The fact that our research subject belongs to the occupational main stream of teleworkers, it should heighten the credibility of this result as a prominent material for future discussions on telework and environment in more general terms.

It is also worth mentioning that many teleworkers in Asia are in similar employment conditions and professions. Under the strict condition that geographical/cultural background carefully be considered, the environmental propensity of our subjects could be applied to their Asian countertype, thus it could possibly be utilized in finding schemes to solve problems such as urban congestion or regional inequity.

Since we took the people-oriented approach as firstly mentioned, further steps including surveys of different types of teleworkers should be taken to have a complete picture for generalization. A place-oriented approach could also be taken for deeper analysis, and we would like to pursue both of them in the future.

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Notes
1. This is possibly due to the two day telework limit that Department of Revenue Service sets on its employee except for the managers.
2. We chose “twice a week” as notable boundary of “frequent” and “not frequent” in judging telework influence on life and environment, because by teleworking 2 days a week, they stay at home for more than a half of the whole week.
3. International Telework Association
4. Voice mail is a popular contact method in U.S., to which people who call to the office can leave messages directed to each employee personally, and to which an employee calls from outside to check messages directed to him/her. Some agencies of CT government make checking voice mails compulsory to teleworkers.
5. e.g. 9.5% want more athletic facilities, 7.9% want more restaurants
6. e.g. there are 1.57 million employed white-collar teleworkers in Japan (Japan Telework Society Survey (2000))

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