

8-15-1997

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Recommended Citation

Westfall, Ralph D., "Does Telecommuting Really Increase Productivity? Fifteen Rival Hypotheses" (1997). *AMCIS 1997 Proceedings*. 98.

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Does Telecommuting Really Increase Productivity? Fifteen Rival Hypotheses

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The telecommuting literature includes frequent references to increases in productivity (e.g., Duxbury, Higgins and Mills, 1992; Venkatesh and Vitalari, 1992). Huws, Korte, and Robinson note the "surprising degree of unanimity" in regard to productivity impacts (1990, p. 44). However many of the claims in the literature derive either from unpublished studies (e.g., Caudron, 1992; Weiss, 1994), or from subjective evaluations of productivity rather than objective measures of output (e.g., JALA Associates, 1990; Nilles, 1994). It is possible that some or all of these gains represent artifacts of the research process or of the specific implementations of telecommuting. Alternative explanations for the reported gains are summarized below under five propositions, which subsume 15 testable rival hypotheses.

PROPOSITION 1. Telecommuting productivity gains may be overstated.

This proposition embodies the concept that reported gains may, in whole or part, reflect inaccurate subjective perceptions or other artifacts of the evaluation process.

Placebo effects are a possibility in any research involving human behavior. Studies concerned with working conditions refer to these effects as "Hawthorne effects." Regardless of the nomenclature, the effects usually do not persist.

H1A. Placebo or "Hawthorne" effects generate temporary telecommuting productivity gains.

Employees tend to overestimate their work performance relative to peers (Meyer, 1975; Zenger, 1994). Perceptions of productivity gains from telecommuting may be another expression of employees' inability to objectively evaluate their own performance.

H1B. Inflated self-evaluations create perceptions of telecommuting productivity gains.

Telecommuters often do work that requires the most concentration, and which may represent the most creative aspects of their jobs, when away from the office. Employees would probably consider such activities the most productive part of their work, regardless of the location.

H1C. Perceptions of productivity gains are an artifact of the type of work done while telecommuting.

Telecommuting programs typically select more desirable candidates from a pool of volunteers (Gordon and Kelley, 1986; Nilles, 1994).

H1D. Telecommuting productivity gains are an artifact of the selection process for telecommuters.

PROPOSITION 2. Productivity gains may result from non-telecommuting aspects of the implementations.

When implemented with groups of employees, telecommuting programs usually incorporate or result in other changes in the work situation. The following changes, although often included in telecommuting programs, could produce productivity gains even in the absence of telecommuting.

Gordon and Kelley (1986) and Nilles (1994) mention specific training for managers of telecommuters. These authors also recommend changes in managerial practices to deal with the challenges of supervising remote workers.

H2A. Telecommuting productivity gains result from higher levels of and/or more effective management supervision of telecommuters as opposed to non-telecommuters.

Gordon and Kelley (1984, ch. 8) include a chapter on training telecommuters. Nilles (1994) recommends formal training sessions. This training may include general issues such time management along with coverage of telecommuting-specific items.

H2B. Telecommuting productivity gains result from increased training in time management, information technology, etc. provided to telecommuters.

Telecommuting implementations with groups of employees may include changes in the tasks or organization of work. Implicitly or explicitly, such implementations may fall into the category of reengineering, which has its own history of claims of large productivity increases.

H2C. Telecommuting productivity gains result from concurrent changes in work processes (reengineering) rather than from telecommuting per se.

Information technology can increase individual productivity. Some implementations may provide additional information technology (hardware, software, telecommunications) to telecommuters. Even if the amount of technology is comparable to that of on-site workers, usage is likely to be higher from remote locations.

H2D. Telecommuting productivity gains result from increases in information technology available to and/or used by telecommuters.

Discussions of telecommuting (e.g., Gordon and Kelley, 1986; Nilles, 1994) typically mention the freedom from distractions and interruptions as a contributor to increased productivity. However relatively high levels of privacy are also available in office environments through innovative systems furniture. For example, Steelcase offers "harbors," cubicles with high walls and doors that can be shut (discussed in Becker, PonTell, Gray, and Markus, 1996, p. 30).

H2E. Productivity gains are an artifact of the isolation from interruptions while telecommuting.

PROPOSITION 3. Increased costs may offset telecommuting productivity gains.

The following hypotheses identify explicit and implicit costs to the organization, or to the individual telecommuter, that could offset any gains from telecommuting.

Part-time telecommuters are likely to require substantial duplication of computer equipment. Telecommuters will generally incur higher telecommunications charges and require additional software.

H3A. Increased costs--for computer hardware, software, telecommunications, supplies, etc.--offset the productivity gains from telecommuting.

Telecommuters may require additional support from on-site employees, e.g., faxing organizational files to the employee's home. Fritz, Higa and Narasimhan (1995) note that telecommuting invariably results in extra work for managers.

H3B. Work displaced to other employees and/or increased supervisory requirements offset productivity gains from telecommuting.

Telecommuting may result in additional work when the employee is at the office, e.g., planning for off-site work, photocopying materials with which the employee will work on telecommuting days, etc. (Gray, 1996).

H3C. On days at the office increases in personal work, resulting from telecommuting, offset an individual's productivity gains on telecommuting days.

Telecommuters can still participate in planned and ad hoc meetings through audio or video- conferencing, but the quality of this participation and resulting decisions may be lower.

H3D. Implicit costs of reduced face-to-face access to telecommuters offset productivity gains.

PROPOSITION 4. Telecommuting productivity gains may not be scaleable.

It is possible that employees will perform some tasks more productively while telecommuting. However it is likely that they will discharge other job responsibilities more efficiently at the traditional workplace.

H4. Productivity gains from the first day(s) of telecommuting in a week are offset by inefficiencies in the subsequent day(s) away from the office.

PROPOSITION 5. Telecommuting may not increase net productivity.

In relation to future research, the preceding hypotheses suggest controls for differences not intrinsic to telecommuting, and adjustments for associated increased costs. Taking all these factors into consideration may cause observed productivity gains to disappear.

H5. Productivity gains resulting from telecommuting per se may be less than indicated by previous studies and these gains, of whatever magnitude, are offset by increased organizational and/or personal costs.

Testing Hypotheses through Economic Analyses

Pending empirical data collection, hypotheses listed under propositions 3 and 4 can be tested via economic analyses incorporating published data or informed assumptions. Westfall (1997) includes economic analyses which test Hypotheses 3A, 3B, and 3D above. The analysis in Table 1 tests Hypothesis 3A. It illustrates the impact of explicit out-of-pocket support costs of \$300 per month for full-time telecommuters (based on Blodgett, 1995) on employees at varying salary and telecommuting levels. The analysis assumes that half of these costs are fixed, with the remainder prorated according to the number of telecommuting days.

Table 1 incorporates an estimated 10 percent productivity impact for full-time telecommuting. This figure is at the high end of the range reported by Olson (1988) for managers' estimates of gains for their telecommuting employees. However 10 percent is near the low end of the range of other published estimates of productivity gains (see summary in Westfall, 1997, Table 6-1). A 10 percent gain is consistent with employees using all of their savings in commuting time to do extra work. The analysis also assumes decreasing returns as levels of telecommuting increase, and that fringe benefits approximate 25 percent of nominal salaries.

Although a \$10,000 salary is a moot issue following passage of higher minimum wage legislation in 1996, it does provide a convenient case for demonstrating the calculations. The analysis assumes that one-day-per-week telecommuting provides, relative to comparable work at the office, a 3 percent productivity gain

for the week (which implies a 15 percent gain on the telecommuting day). The value of the employee's work is conservatively

Table 1 - Telecommuting Productivity Gains, Net of Out-of-Pocket Support Costs

<u>Nominal Annual Salary</u>	<u>Telecommuting Days/Week [Productivity Gain]</u>					<u>Break-even Days</u>
	<u>5 Days [10% gain]</u>	<u>4 Days [9% gain]</u>	<u>3 Days [7.5% gain]</u>	<u>2 Days [5.5% gain]</u>	<u>1 Day [3% gain]</u>	
\$10,000	\$(2,350)	\$(2,115)	\$(1,943)	\$(1,833)	\$(1,785)	NA
20,000	(1,100)	(990)	(1,005)	(1,145)	(1,410)	NA
30,000	150	135	(68)	(458)	(1,035)	3.33
40,000	1,400	1,260	870	230	(660)	1.74
50,000	2,650	2,385	1,808	918	(285)	1.24
60,000	3,900	3,510	2,745	1,605	90	0.95
70,000	5,150	4,635	3,683	2,293	465	0.79
80,000	6,400	5,760	4,620	2,980	840	0.68
90,000	7,650	6,885	5,558	3,668	1,215	0.60
100,000	8,900	8,010	6,495	4,355	1,590	0.53
Break-even Salary	\$28,800	\$28,800	\$30,720	\$36,655	\$57,600	

approximated by his or her total compensation: \$10,000 salary plus \$2500 for fringe benefits at 25 percent. Multiplying \$12,500 by 3 percent indicates a gross productivity benefit of \$375 per year.

Fixed out-of-pocket support costs are estimated at \$150/month, and a variable cost of \$150/month is prorated at 20 percent for one-day-per-week telecommuting. This results in total support costs of \$2160 per year which, net of the \$375 annual productivity gain, results in the \$1785 annual loss indicated in the corresponding cell of the table.

The analysis in Table 1 partially supports hypothesis 3A. Support costs offset productivity gains for lower-salaried employees and for lower levels of telecommuting. The analysis indicates a break-even minimal salary level of around \$30,000 per year for three to five-day-per-week telecommuting. However for higher salaries, gains exceed the costs even at lower telecommuting levels.

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