1996-F-520-08-1

INDIVIDUAL RESEARCH PAPER:

EVALUATION OF THE ARTICLE, "TELECOMMUTING: PROBLEMS ASSOCIATED WITH COMMUNICATIONS TECHNOLOGIES AND THEIR CAPABILITIES"

Prepared for:

Professor D. Kocaoglu Management of Engineering and Technology Fall 1996

Prepared by:

Amy Cordle

December 2, 1996

Introduction

Gupta et al published an article in the November 1995 issue of IEEE Transactions on Engineering Management entitled, "Telecommuting: Problems Associated with Communications Technologies and Their Capabilities" (herein referred to as the article) [5]. The article discussed communications issues faced by business owners and non-business owners in urban, suburban, and rural areas of the southern United States. This paper is an evaluation of that article.

Background

The article investigated the communications problems and needs of telecommuters. Using a survey instrument, whose development is described below, the authors collected data from business and non-business owners in urban, suburban, and rural areas of the southern United States. The survey evaluated communications problems experienced by the different groups and the communications abilities perceived by these groups to be important. Analysis of the survey results detailed which perceived problems and abilities were common or specific to the different groups and attempted to identify the degree to which the problems and abilities affected firms' performance and telecommuters' effectiveness. The authors also briefly examined new communications technologies such as document sharing, video conferencing, and caller identification, and applied the new technologies as applicable to provide solutions for the telecommuters' communication problems. The authors used the results of the survey to show the implication of communication-related issues on technology providers, managers, the university community, and researchers.

Methodology

Gupta et al used three focus groups to develop a survey instrument. The first two focus groups were comprised of representatives of a major regional phone company and the third focus group consisted of small business owners and residential users of telephones. Focus groups were used in the design of the survey to gather qualitative data, better understand the market for new communications technologies, and analyze issues not appropriate or difficult to measure using a survey [5].

Using information culled from the focus groups, the survey questionnaire was designed to identify the communications-related problems that telecommuters faced and the relative importance of the problems. The survey investigated communication-related abilities that would improve the productivity and efficiency of telecommuters [5]. The survey also included questions to determine if the surveyee was a business owner or non-business owner, whether their main residence was

1

urban, suburban, or rural, and the extent of the business activities performed at their residence. Two survey populations were sampled—residential customers and business customers selected randomly from the databases of a regional phone company.

Analysis of variance was used to compare the communication problems and abilities data of the different groups. Exploratory factor analyses were conducted on the perceived problems and abilities of telecommuters. Principal components factor analysis was used to assess if the items on the survey were in fact different types of problems and abilities. Correlation and regression analysis was used to evaluate telecommuters' communication problems and abilities versus their firms' performance.

Analysis

A literature search on telecommuting and related topics revealed that most of the available telecommuting information is contained within popular literature—computer-, business-, engineering-, communications-, and sociology-related magazines. Much of the literature on telecommuting focuses on statistical information (such as the number of companies with telecommuting programs in place), the advantages and disadvantages of telecommuting to employers and employees, benefits to traffic and air quality, and individual aspects of communication-related issues and new communication technologies. Some literature contained nonspecific information about workers inclination to reject telecommuting for communicationrelated reasons [3]. A literature search of available research indicates that most quantitative research focuses on energy reduction [18], traffic [10], social issues [6], and other environmental effects [11]. No studies corresponding specifically to the issues brought out in the article, to the extent they were evaluated in the article, were discovered. This lack of empirical data is evidenced from the types of references cited within the article itself. To the extent that such data as were presented in the article are unavailable, the article was a positive contribution to the existing body of literature. The dynamic nature of communications technologies at this time [1] [8] [12] [17], however, may result in the information contained within the article becoming obsolete at perhaps a faster rate than for other telecommuting topics.

The concepts presented in the article generally were strong. The topic is relevant to the current business environment where telecommuting continues to gain in popularity [4]. The use of focus groups, particularly representatives of a telephone company, was positive in that the groups provided an overview of what capabilities were available to the telecommuters and, as a service provider to telecommuters, could offer insights into problems encountered. The use of focus groups to entirely define perceived problems and abilities seems somewhat limited in surveying

2

telecommuter's individual experiences. As a telecommuter, some of my most frequently occurring problems were not accounted for on the list of problems generated by the focus groups.

The division of the survey sample into business/non-business owner and urban/suburban/rural consumers was a strength of the article in that it revealed the extent to which business situation and location affects communication constraints and opportunities. It was also a strength of the survey that it analyzed the level of importance each group placed on communications abilities. This information would be valuable to service providers in planning and marketing communication technology products. The reasons for the similarities and differences between situation and location, while in some cases obvious, would have been valuable information in analyzing communications opportunities. For instance, it would have been interesting to know what factors caused a difference in the ability of customers to reach the telecommuter in urban versus suburban areas.

The methodology and the analysis of the survey data were well explained and well presented in the article. Of the three survey goals identified in the abstract of the article—to identify communication needs and problems, to clarify new technologies' potential to fill those modern needs, and to qualify the impact of needs on telecommuters' effectiveness—the first goal was most adequately met. The article provided only a cursory look at communications technologies (Table II). The technologies were presented in the form of usage mode and applications, which did not directly correspond to communications problems and abilities. This provided only an apples to oranges comparison of the new communication technologies' abilities to satisfy the perceived communication needs. While possible solutions to some of the problems and abilities were provided in the text of the article, the generic nature of the problems and description of technologies were not adequate to clarify the new technologies' potential to fill those needs. The third goal, rating of effectiveness, while analyzed empirically, was somewhat subjective since telecommuters were asked to rate their own firms' performance. However, the conclusion that communication abilities directly correspond to a firms' performance, especially for small firms, seems inherently obvious.

The first conclusion drawn from the article is that the perception of communication problems and abilities differ among business and non-business owners in urban, suburban, and rural areas. This conclusion has been adequately documented in the article. The second conclusion drawn is that firms can increase their performance through use of effective communications technologies in facilitating telecommuting. As discussed above, this statement is most certainly true for small firms, but may be less applicable for larger firms if the number of non-telecommuters far outweighs the number of telecommuters. In this case, a new communication technology investment may not provide a sufficient return on investment. A conclusion not specifically identified in the article is

3

that effective communications technologies can increase the individual telecommuter's performance, a fact I've found to be true in my telecommuting experience.

The references cited in the article generally followed the types of references discovered through the literature search undertaken for the evaluation of the article. Additional information not specifically related to the article was available from government publications on federal flexible workplace program issues [16] and private organization sources [14] [11].

Conclusions

The article contributed to the understanding of problems and needs of different types of telecommuters in the southern United States. Additional or similar studies in other areas of the country, such as the San Francisco Bay Area, would provide an interesting comparison of how the telecommuting situation varies by regional location. A study of the available or reasonably foreseeable communications technologies and their actual and perceived ease of acquisition and use would be valuable to those engaged in or contemplating telecommuting.

Bibliography

- [1] Suzanne Askren, "Dial Up Dollars With ISDN-ISDN is in a High-growth Pattern," *VAR Business*, October 1, 1995.
- [2] Bob Bellinger, "Telecommuting," *Electrical Engineering Times*, August 12, 1996.
- [3] Mitch Betts, "Workers Slow to Accept Telecommuting," *Computerworld*, February 20, 1995.
- [4] Eric Goldman, "More Fortune 1000 Companies Say They Will Try Telecommuting in 1996," *Business Wire*, March 4, 1996.
- [5] Y. P. Gupta, J. Karimi, and T. M. Somers, "Telecommuting : Problems Associated with Communications Technologies and Their Capabilities," *IEEE Transactions on Engineering Management*, vol. 42, no. 4, pp 305-318, November 1995.
- [6] Rob Kling and Tom Jewitt, The Social Design of Worklife With Computers and Networks: An Open Natural System Perspective, University of Indiana, Bloomington, November 1996.

- [7] Paul Merenbloom, "Telecommuting Travails Offer Valuable Lessons," *InfoWorld*, vol. 18, No. 24, p 5, June 10, 1996.
- [8] Paul Marenbloom, "800 Numbers Pave the Way for Smoother Remote Hook-ups," *InfoWorld*, vol. 16, no. 41, p 82, October 10, 1994.
- [9] Paul Marenbloom, "Calling the Office While on the Road Requires Some Tricks," *InfoWorld*, vol 18, no. 25, p 14, June 17, 1996.
- [10] Patricia Mokhtarian, Unraveling the Complex Relationship Between Telecommunication Options and Travel Behavior, University of California, Davis, Department of Civil Engineering.
- [11] PS Enterprises, On Telecommuting: A PS Enterprises White Paper, 1995.
- [12] Amy Rogers, "Not So Remote Any Longer-New Telecommuting Wares Meet Increasing User Demand," *Communications Week*, June 17, 1996.
- [13] State of Maryland, Telecommunication Network Study, Prepared by Booz Allen and Associates, March 1996.
- [14] Symantec Enterprises, Symantec White Papers-Remote Computing, June 6, 1996.
- [15] Evan Schuman, "Emerging Technologies-Bringing New Life To Telecommuting," *Communications Week*, July 1, 1996.
- [16] U.S. Office of Personnel Management, "The Federal Flexible Workplace Pilot Project, Work-at-Home Component: Final Report," January 1993.
- [17] John Zyskowski, "Tuning In To Cable Modems," *Computer Shopper*, December 1995.
- [18] _____, Reducing Transportation Energy Consumption Through Telecommuting Feasibility and Demand, University of Texas.