

ABSTRACT

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This thesis examines the diffusion of a broadband telecommunications infrastructure (the High Performance Wireless Research and Education Network - HPWREN) within the 4500-acre Santa Margarita Ecological Reserve (SMER). The SMER, which is located in southern California, is primarily utilized for studies by researchers from San Diego and Riverside county research and teaching institutions. Recently deployed sensors and high-resolution cameras allow researchers from throughout the world to conduct their studies at SMER—and receive their sensor and camera data via the Internet. That is, the collected ecological data travels via the Internet (originating with the HPWREN connection) from dataloggers and cameras in the field directly to the researcher's computer. Before such an innovation is adopted by users, though, it is important for them to be familiarized with the technology and willing to adopt it. Therefore, this project examines the perceived attributes and communication channels used during the deployment of the HPWREN technology. This thesis also looks at the ways in which the SMER scientists perceive the HPWREN and related technology; specifically, the project discusses how the technology will be relatively advantageous to their research and teaching endeavors, compatible with their current data collection procedures and teaching curricula, and whether or not the technology will be too complex for them to use within their current and future work.

The literature review presents a propositional diffusion model, which includes four sub-models: (a) social system, (b) innovation development, (c) innovation implementation and use, and (d) consequences. Based upon Rogers' (1995) diffusion of innovations theoretical framework, this critical portion of the research suggests ways in which a propositional diffusion model might provide a rationale for future studies regarding longitudinal impacts of broadband connectivity upon the communication methods used by ecological field researchers and ecological field research in general.

Focusing on the innovation development and implementation sub-models, the analytical portion of the thesis project discusses perceived attributes during the development stage and then

closely studies continued perceptions, diffusion communication, and use during the implementation phase. Specifically, SMER and HPWREN research personnel (including the author) collected survey data related to SMER researchers' perceptions of the network connectivity, their communication channels, and use of the network. Path bivariate correlations provided support for eight of nine hypotheses related to perceived attributes (relative advantage, compatibility, complexity), communication channels, and network use among 37 field scientists that are conducting research at the HPWREN-connected SMER.

Simultaneous regression analysis of diffusion communication with relative advantage, compatibility, and complexity as predictors resulted in significance for both relative advantage and complexity; however, multiple regression results indicated that perceived compatibility is not a significant predictor of diffusion communication. On the other hand, simultaneous regression analysis of all variables, with adoption acting as the dependent variable, showed that perceived compatibility, perceived complexity, and diffusion communication all have a significant impact upon HPWREN adoption. Perhaps the most important lesson learned during this study was the vital role played by communication during the innovation development, implementation, and use stages.