Assessing User Computing Effectiveness: An Integrated Model

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The importance of end-user computing (EUC) to organizations continues to grow. Many organizations are making sizeable investments in this area. It has become increasingly important for managers to understand the important factors to EUC effectiveness. This paper reports the results of a field study that investigated the determinant EUC effectiveness among 187 end-users. A conceptual path analytic model was developed and tested. The results show that end-user computer experience and attitudes toward EUC have strong direct effects on the variety of tasks for which the system is used, and on general system usage. While lack of task structure has negative effects on end-user satisfaction, end-user attitudes toward EUC have positive effects. Finally, support for EUC has a positive effect on perceived changes in job effectiveness but task structure is found to have a negative effect.

The vast proliferation of end-user computing (EUC) has been widely reported [Van Kirk, 1995; Caginalp, 1994; Burrows, 1994; Igbaria, Pavri & Huff, 1989]. The explosion has happened in the United States as well as overseas. Indeed, it is a world-wide phenomenon occurring in Japan [Patton, 1995], in Europe [Preston, 1994], as well as other developing nations [Anonymous, 1994]. EUC has been one of the most striking of many changes in how organizations use computers since the early 1980s, and it is expected that most organizations will continue to increase their EUC expenditures and that the number of microcomputers will increase steadily in the 1990s (Van Kirk, 1995; Caginalp, 1994; Burrows, 1994).

Many authors have recognized that the expansion in end-user computing activities within relatively large organizations requires substantial investment in personnel and facilities for support [Igbaria, Guimaraes & Davis, 1995; Van Kirk, 1995; Guimaraes, 1986; Leitheiser & Wetherbe, 1986; Guimaraes, 1984a]. The large number of organizations that have established Information Centers (IC) attests to their importance in supporting end-user computing activities. Very clearly, from the beginning ICs have evolved over time [Guimaraes, 1984b] and apparently continue to evolve energetically today [Guimaraes & Igbaria, 1994; Guimaraes, 1996]. The importance of understanding the issues surrounding IC organizations and its mission has not escaped the attention of academic researchers. Critical issues such as managing data, training users, and managing end user activities have been studied widely (Igbaria et al., 1995; Guimaraes & Igbaria, 1992; Magal, Carr & Watson, 1988). Further, the determinants and consequences of job satisfaction among IC personnel were studied by Guimaraes and Igbaria [1993], including a comparison of IC versus IS personnel in terms of the same variables [Guimaraes & Igbaria, 1992].

As corporate investment to provide the computing resources and maintain support for EUC activities continues to grow, business managers wonder about the benefits from the investments. Needless to say, while the productivity increases from EUC may be hotly debated, without system usage it becomes a non-starter issue. Thus, microcomputer usage, despite its obvious weaknesses as a measure of EUC success, becomes an exceedingly important variable worthy of academic and practitioner attention.

Much of the research on computer-based system implementation has been focused on identifying factors conducive...
to success or failure, including user involvement [Barki & Hartwick, 1989; Baronas & Louis, 1988], management support [Lee, 1986; Leitheiser & Wetherbe, 1986], end-user’s expectations and attitude [Robey, 1979], politics [Markus, 1983], communications between developers and end-users [DeBrander & Thiers, 1984], task structure [Guimaraes, Igbaria & Lu, 1992], and end-users’ training and experience [Nelson & Cheney, 1987]. In a similar vein, the purpose of this study was to continue the investigation of the factors related to the success of EUC. The model proposed here is unique in that it integrates a broad set of variables leading to three major outcome variables representing different aspects of EUC success: system utilization, end-user satisfaction with the system, and its effect on the end-user’s job.

**Theoretical Framework**

This study uses a broad definition of EUC including anyone who uses computer technology hands-on and is not an information systems professional. Prior research has employed various measures of system success, including user satisfaction [Galletta & Lederer, 1989; Kendall, Buffington & Kendall, 1987; Mahmood & Sniezek, 1989], system usage [Mykytyn, 1988], perceived benefits of systems [David, 1989; Money, Tromp & Wegner, 1988], improved decision quality and performance [Kottemann & Remus, 1989], and business profitability [Sharda, Barr & McDonnell, 1988]. The choice of “best” measure for system success depends on the study objectives. All the measures mentioned above, including user satisfaction, and system usage, have advantages and disadvantages. On the other hand, user satisfaction has been proposed as the most useful surrogate measure of system success [Guimaraes & Gupta, 1988], and as “the most useful assessment of system effectiveness” [Hamilton & Chervany, 1981].

End-user satisfaction and system utilization have been used as two important indicators of EUC effectiveness by Srinivasan [1985]. A comprehensive discussion of system success by DeLone & McLeen [1992] proposes that compared to other factors, user satisfaction and system usage have been widely used, making them important as enablers for inter-study comparison. For these reasons, we used these constructs in this study. End-user satisfaction refers to the affective reactions of individuals toward specific computer system applications. System utilization represents the behavioral indices of user acceptance of the application system [Ives & Olson, 1984]. Two dimensions of system utilization reflecting intensiveness and extensiveness of use were examined: system usage or time spent in use of the system, and utilization categories that refers to the number of areas for which the system is used [Delone, 1988; Srinivasan, 1985]. Last, based on Millman and Hartwick’s [1987] findings that office automation results in more enriching and satisfying jobs, perceived change in jobs due to computer technology was examined as an additional indicator of EUC effectiveness.

A review of the relevant literature indicates that the potential determinants of EUC effectiveness may be grouped into three categories: (1) individual characteristics (e.g., age, gender, education, computer training, user experience), and beliefs (e.g., computer anxiety, attitudes toward EUC); (2) task characteristics, i.e., task structure; and (3) organizational characteristics (e.g., end-user support). The main objective of this research is to test the four main hypotheses presented below, while also checking the possible direct and indirect effects of the independent variables on the dependent success variables. Figure 1 presents the variables included in the study and the hypothesized relationships among them. The rationale for each relationship is reviewed next.

The importance of individual characteristics in influencing user attitudes and eventual MIS success has been emphasized by Lucas [1978], and Zmud [1979], and has been
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