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 sup-
port [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 em-
ployed 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 disadvan-
tages. 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 assess-
ment 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 auto-
mation results in more enriching and satisfying jobs, per-
ceived change in jobs due to computer technology was exam-
ined 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 influenc-
ating user attitudes and eventual MIS success has been empha-
sized by Lucas [1978], and Zmud [1979], and has been

Figure 1: End-User Computing Effectiveness: A Conceptual Path Model

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