The Status of End-User Computing Support: An Exploratory Study

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Abstract

End-User Computing (EUC) influences user productivity, information systems backlogs and user satisfaction. An exploratory study of 192 Midwest end-users was undertaken to investigate support services and end-user types superimposed on support sources. The results of this integrated review offer a richer understanding of end-user dynamics. Data collection occurred through a three-part questionnaire. End-user types were categorized using the Cotterman and Kumar (1989) classification scheme. Support categories were assessed using the Mirani and King (1994) instrument. The Govindarajulu and Reithel (1998) assessment instrument evaluated support services within information centers for local MIS staff and informal assistance. Results are presented from instrument validation procedures and descriptive data analysis that permit conclusions about EUC dynamics. Instrument validation was conducted using standard measures of internal consistency reliability and factor analysis, Cronbach's alpha and a Principle Components Factor Analysis (PCFA), to facilitate factor loading. Descriptive data analysis employed conventional frequency distributions, scatterplots, descriptive data statistics, and other graphical data displays.

Keywords: End-user computing, EUC Support, End-user Types, Measures of Classification

Introduction

End-User Computing (EUC) began in the late nineteen-seventies after the IBM personal computer (PC) was introduced and is widespread in organizations today. According to Aggarwal (1984), end-user computing is defined as systems developed by end-users (on their own or with assistance from a data processing department, information resource center, informal sources or functional experts) to support their decision making. EUC has many benefits including increased user productivity, decreased information system backlogs, and increased user satisfaction (Brancheau, et al, 1985; Davis & Bostrom, 1993; Lee, 1986; Leitheiser & Wetherbe, 1986; Rivard & Huff, 1984).

Realizing these effects, organizations provide support mechanisms such as helpdesks, information centers, and PC support centers. The main objective of helpdesks is to help users help themselves. Another objective is to reduce risks associated with EUC. Since end-users are not trained professionals in application development, end-user applications are prone to limitations such as minimal documentation and threats to data integrity and security (Alavi, Nelson & Weiss, 1987). While end-users found helpdesks to be very useful in the early days of computing, a recent study shows that helpdesks are minimally used by end-users (Govindarajulu, 2002). This study is consistent with earlier research findings that end-users use alternate sources of support including informal support and local support staff (Govindarajulu, 1996). These alternative support services may be due to role transformations by end-users, i.e. end-users to 'knowledge workers' (McLeod & Schell, 2001).

In today's corporate environment, end-users have access to a variety of easy to use help software. Additionally, personal computers have been standard office equipment for more than a decade. End-users are more knowledgeable of computing technologies and hence may not be satisfied with the basic support provided by helpdesks. Research has found five main support sources available to end-users today. These include: (1) helpdesks (also commonly referred to as information centers and PC support centers), (2) local MIS staff, (3) informal assistance from friends and colleagues, (4) online assistance, and (5) vendor support.

Mirani and King (1994) developed an instrument to identify types of support provided by information centers (helpdesks). End-user support services include development support, data support, and purchasing support among others. Govindarajulu and Reithel (1998) designed a general instrument based on the support services that are common across information centers and local MIS staff. This instrument identified some additional support types that can be categorized as:

- General computing support that includes hardware, software and training support;
- Purchasing support;
- Data support; and,
- Functional support.

Support needs of end-users vary based on their knowledge of end-user computing technologies. Cotterman and Kumar (1989) identified eight different groups of users based on the three main dimensions of EUC – development, operation, and control. The different user groups are: (1) user-consumer, (2) user-operator, (3) user-developer, (4) user-controller, (5) user-operator/developer, (6) user-developer/controller, (7) user-operator/controller, and (8) user-operator/developer/controller. The Cotterman-Kumar classification scheme, however, has not been widely embraced within the field because of the absence of a validated measurement instrument. Other classification schemes including McLean (1979) and Rockart and Flannery (1983) fail to represent the contemporary end-user. In the current research, a ten-item instrument is used for end-user classifications. Differences in end-user identification may also affect support services.

A typical technique for analysis in classification studies is the use of cluster sampling. Cluster sampling can be hard and crisp or fuzzy. Hard and crisp clustering permits discriminate only categorizations, thus, increasing self-selection bias. Fuzzy clustering is a cluster analysis technique that permits a more continuous processing and reporting of data through determining degrees of membership of an entity within a cluster. Classification of respondents into descriptive clusters can overlap presenting a more refined data interpretation through gradual membership. Probability determinants are used to assist in fuzzy cluster assignment. Fuzzy clustering is a selected technique in this study for looking at differences in end-user types.

Understanding EUC dynamics is dependent on differences in groups of end-users, categories of support, and support sources. This can be of value to both practitioners and researchers. For practitioners, the knowledge helps to create optimal support strategies to maximize EUC benefits and to reduce EUC risks. For researchers, understanding EUC dynamics helps contextualize, model and study end-user behavior. This research provides an integrated classification system to better understand and use EUC dynamics.

Instrumentation

To study EUC dynamics, a three dimensional framework of end-user types, support categories, and support sources is presented. This study helps to determine which support sources are used for the differing support services by different user groups. For this exploratory study, a support category classification in-

strument developed by Govindarajulu and Reithel (1998) is used. Table 1 provides the category dimensions and instrument item indices.

Dimensions	Indices
Hardware Support Software Support Training And Education Data Support Functional Support Purchasing Support	• Demonstrating Hardware • Standardization Of Hardware • Support Telecommunications Hardware • Assisting With Application Maintenance • Variety Of Software Supported • Support Telecommunications Software • Providing Training In Data Transfer • Providing Users With Basic Training • Providing Users With Advanced Training • Assisting Users In Locating Data • Assisting With Data Transfer • Providing Backup, Recovery, And Archiving • Facilitating Data Sharing Among Users • Maintaining Subject Databases • Assist User In Problem Specification • Assist User Designing The Application • Assist User In Choosing Techniques • Develop Application For/With Users • Generating Prototypes
	• Listing Approved Hardware Vendors • Outlining Formal Procedures For Getting Hardware Purchases Approved • Listing Approved Software Vendors • Outlining Formal Procedures For Getting Software Purchases Approved

Table 1: Support Categories and Items (Govindarajulu & Reithel, 1998)

For end-user types, a ten-item instrument (Govindarajulu, 2002) is used to classify users into different groups. The instrument items are guided by Cotterman and Kumar's (1989) definitions for development, operations, and control. Table 2 provides the instrument as distributed. The five support sources proposed in this research are used to complete the tri-dimensional framework.

EUC Dimensions And Items On The Questionnaire	Scale
Development Please rate 1. Your involvement in the design of end-user applications 2. Your involvement in the specification of end-user application requirements 3. Your involvement with respect to actual coding of end-user applications 4. Your involvement in the implementation of the applications developed by them and/or by others	No Involvement ... Active Involvement 1 2 3 4 5 6 7 1 2 3 4 5 6 7 1 2 3 4 5 6 7 1 2 3 4 5 6 7
Operation Please rate the extent of your use of end-user applications 1. Developed by others in the department 2. Developed by others in the firm	Low Extent ... High Extent 1 2 3 4 5 6 7 1 2 3 4 5 6 7
Control Please rate 1. Your decision-making authority to acquire hardware (hard disks, RAM etc) for the department 2. Your decision-making authority to acquire software (MS Office, Corel	No Authority ... Complete Authority 1 2 3 4 5 6 7 1 2 3 4 5 6 7 1 2 3 4 5 6 7

Suite etc) for the department 3. Your authority to initiate, manage, and implement new end-user applications 4. Your authority to collect, store, and use data for the end-user applications	1 2 3 4 5 6 7

Table 2: Instrument to Classify End-Users (Govindarajulu, 2002)

Instrument Validation

A questionnaire was designed, developed, and tested through a measure of internal consistency reliability (Cronbach's Alpha) and through factor analysis to determine factor strengths using Principle Components Factor Analysis (PCFA). Both the end-user support items instrument and the end-user classification instrument were validated.

Population

The study questionnaire was distributed and administered to end-users in the Midwest United States. After eliminating incomplete responses, 192 usable responses were accepted for processing.

Analysis

Initial analysis resulted in three fuzzy clusters: User-Operator/Developer, User-Operator/Developer/Controller, and User-Operator. Analysis will be performed to study end-user dynamics addressing the following three questions:

1. What is the extent of reliance of each cluster on the support sources for different areas of support?
2. What is the extent of membership within a cluster and reliance on the support sources for different areas of support? and,
3. What is the degree of support received by each cluster?

Data analysis will be presented at the conference.

Results

Preliminary results indicate the following:

1. The emergence of three fuzzy clusters;
2. The reliance on support sources vary by clusters; and,
3. Increasing membership in a specific cluster is associated with increasing use of support sources.

Final results will be presented at the conference.

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