Improving User Satisfaction in VO through Systems Usability

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INTRODUCTION

The Web-based information systems regarded as a specific type of information system (IS) bring significant advantages to organizations and users because they are tools to manage, disseminate, and obtain knowledge. The advantages or benefits include creation of added value to goods and services, greater safety, better service, competitive advantage, error reduction, improved product quality, improved communication, efficiency, and productivity, greater administrative efficiency, more opportunities, cost reduction, reduction in labor requirements, stronger support to decision-making, stricter control over operations, and better decision choices (Stair, 1996).

Web-based information systems offer advantages to organizations and to individual and private users, enabling them to obtain data, information, and knowledge in support of individual and private decision-making. This is because these systems provide information and tools that allow users to make more effective choices and better decision-making (Sá & Aguilar, 2004).

As far as the organizations are concerned, these systems contribute to improve business opportunities, as well as communication and competitiveness in global transactions and markets. Web-based information systems not only facilitate the sharing of information at lower costs, thanks to the scale economies that the Internet has generated, but also attract attention to areas related to business processes, offering advantages in low-cost and flexible solutions, especially when it comes to distributed and collaborative work (Takahashi & Liang, 1997).

Web-based systems not only allow wider dissemination of information, but also promote interaction between users and processes in business tasks that ultimately will lead organizations and users to fulfil their objectives. System quality is increasingly being regarded as a critical element in the success of organizations, since it guarantees a competitive global position, being essential to secure consumer satisfaction with products, services, or processes.

USABILITY

The usability concept refers to the time a system takes to perform tasks, to user satisfaction, and to the ease with which the user learns to interact with that system. Regarding software engineering, the term "usability" is commonly associated with user interface design. According to the ISO 9126-1 standard (ISO/IEC, 1998), usability is defined as "the capability of a software product to be understood, learned, used, and attractive to the user when used under specified conditions."

The expression "quality in use" also addressed in that standard as terminology for usability, is defined as "the capability of the software product to enable specified users to achieve specified goals with effectiveness, productivity, safety, and satisfaction in specified contexts of use."

The basis of usability is ease of use. It means that the objectives of usability are connected with factors ultimately seeking to afford:

- **Learning:** Ability to understand and learn how the systems operates
- **Memorizing:** Ability to memorize how the system operates and to improve such skills with continuous use of the system
- **Interaction:** Ability to explore the system and discover its additional functionalities
- **Satisfaction:** Capability of the system to provide adequate response to user needs

According to the ISO 9126-1 standard, the characteristics of usability are understandability, learnability, and operability. Similarly, Nielsen (1994) and Shneiderman and Hochheiser (2001) consider five characteristics of usability: learnability, effectiveness, tolerance to error, satisfaction, and memorizing.

Usability Measures

In formal terms, usability is the probability of a user of a specified system not to be faced with problems with the relevant interface, during a given operability period and in a specific context of use. Usability measures identify aspects crucial to business processes and user perspectives, being defined in terms of the characteristics they intend to evaluate, the performance of the measurement techniques, as well as the data and information they refer to.

Usability measures that are internal to the system usually refer to aspects of manual structuring, use of menus and graphs, informative system error messages, help messages to the user, and existence of consistent interfaces. The external measures essentially refer to aspects of learnability and operability, in other words, they afford measurement of how easy it is to learn to work with that system and how productive the relevant user is.

Considering that ease of use is a crucial factor in the success of products and services and that, among other aspects, user performance directly affects sales, cost of services and customer loyalty, IBM (2003) developed a set of User Engineering measures. Next, we list such measures relating to user satisfaction and performance of the operative tasks.

Measures of user satisfaction:

- **Ease of use:** Measure of the ability of the user to perform tasks efficiently
- **Function:** Measure of user satisfaction with the system's functionalities and how these functionalities can help him or her perform the relevant tasks
- **Information:** Measure of user satisfaction with the system's support information, including manuals, accessibility to instructions or help guides
- **Initial experience:** Measure of user satisfaction in the early stages of contact with the system, as for instance with program installation or performance of basic tasks
- **Integration:** Measure of user satisfaction with the system's inter-operability with other products, as for instance data and information sharing
- **Overall:** Measure of overall user satisfaction with the system

- **Performance:** Measure of user satisfaction with the system's capability in terms of speed and efficacy, above all in critical or extreme situations
- **Reliability:** Measure of user satisfaction or trust and confidence in the system's efficiency, efficacy, and suitability for the intended purposes

Measures of operative tasks:

- **Assists:** It measures the degree of assistance required during the testing phase for correct control over task performance
- **Completion rate:** It measures the ability of the user to perform tasks correctly in order to attain a specified objective
- **Error rate:** It measures the amount of error while users are trying to complete tasks successfully
- **Time:** It measures the time required to complete tasks correctly and achieve task-specific objectives

Usability or "quality in use" refers to specific users in specific contexts. The metrics of quality in use, patent in the ISO 9126-4 standard (ISO/IEC, 2001), measures how users attain their objectives in terms of effectiveness, productivity, safety and satisfaction.

Effectiveness metrics:

- **Task effectiveness:** It indicates which task objectives have been correctly attained
- **Task completion:** It evaluates the amount of tasks completed
- **Error frequency:** It indicates the amount of errors per task

Productivity metrics:

- **Task time:** Time necessary to complete a task
- **Task efficiency:** Amount of objectives attained in a stated period of time
- **Economic productivity:** Task cost-effectiveness
- **Productive proportion:** Proportion of time users take to carry out a specified action correctly
- **Relative user efficiency:** User efficiency as opposed to an expert's

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