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Using Data Visualisation to Represent Stages of the Innovation-Decision Process

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ABSTRACT

This article describes the development of a visual aid to depict the manner in which Internet applications are being diffused through local sporting associations. Rogers' (2003) Innovation-Decision process categories are used as the theoretical basis of the study. The article discusses the Innovation-Decision process as an important component of Rogers' (2003) Innovation Diffusion approach. It then outlines the problem at hand, determining how best to represent the adoption and use of Internet applications by different sporting associations. To this end, different data visualisation approaches to representing the data are investigated, with the introduction of an aid the authors have labelled I-D Maps used to represent the adoption of these applications. This article demonstrates how, when compared with the other methods of visual presentations (such as line and bar graphs), the I-D Mapping method is a more suitable method of visual presentation when used with real world data.

Keywords: *I-D maps; innovation-decision process; innovation diffusion; sporting associations*

INTRODUCTION

The theory of innovation diffusion has been used for decades to provide insights into how different innovations have been adopted. This article discusses the use of the Innovation-Decision Process (a component of Innovation Diffusion theory) as a lens to examine the adoption of Internet technologies in local sporting associations. In particular, the article focuses upon the development of a visual aid to depict the manner in which these applications are diffused through the associations and to allow direct comparisons of this diffusion between different associations. After discussing the Innovation-Decision Process, a brief description of the use of Internet applications in local sporting associations is provided. Data visualisation is employed as a means to represent the diffusion process of the Internet applications and the

developed visual aid is presented with sample and actual data.

BACKGROUND

There are a number of approaches that can be used to examine the adoption and use of technology. One of the most popular is known as the Diffusion of Innovations (or just Innovation Diffusion). The theory has been used to conduct research into the adoption of many different innovations and has undergone some modifications, with the 5th edition of the book Diffusion of Innovations being recently published (Rogers, 2003).

The innovation diffusion approach has provided an important insight into how technologies are adopted into everyday lives for a number of decades now. Rogers' theory of the Diffusion of Innovations was first introduced in the 1960s. However it has since been revised a number of times and has been used to describe change in many sectors, ranging from anthropology, education, sociology, general economics and many more. The innovation diffusion model (Rogers 2003) provides a general explanation of how new ideas disseminate through social systems over time (Kappelman 1995, Suraya 2005).

A number of theories have addressed the adoption of an innovation. Social Learning Theory (Bandura 1977), Concerns-Based Adoption Model (Hall and Hord 1987), and Rogers' Diffusion of Innovations theory (2003) have been the most commonly used frameworks in many studies. In Social Learning theory, Bandura (1977) classes the influences on human social behaviour as personal, environmental, and behavioural (Dembo 1994, Schunk 2000). Like the Diffusion of Innovations theory, the Concerns-Based Adoption Model (Hall and Hord 1987) is another popular adoption model (Sherry and Gibson 2002). This model depicts eight different stages of innovation: non-use, orientation, preparation, mechanical use, routine, refinement, integration, and renewal (Sahin and Thompson 2006). Whilst the Concerns-Based Adoption Model focuses more on the adoption of an innovation, Social Learning Theory looks at highlighting the diffusion and social learning in a manner that is consistent with Rogers' diffusion of innovation theory. However Rogers' theory brings together both of these approaches by examining the adoption and the diffusion of an innovation (Sahin and Thompson 2006).

Rogers (2003) explains the diffusion of an innovation as "the process in which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas." (Rogers 2003, 5)

According to Rogers (2003), the adoption rate of an innovation is determined by four elements. These elements are identifiable in every diffusion research study or diffusion campaign (Sahin and Thompson 2006). The four elements are: the innovation, communication channels, time and a social system. These attributes are now discussed further.

The Innovation

According to Rogers (2003), an innovation is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003, 12). In fact, Rogers suggests that the idea does not actually have to be new- it only needs to *appear* to be new to the individual.

An examination of the perceived attributes of an innovation can provide an important focus that can explain its rate of adoption. In a review of 75 articles relating to innovation characteristics and their relationship to innovation adoption and implementation, Tornatzky and Klein (1982) concluded that three innovation characteristics (relative advantage, compatibility, and complexity) had the most consistent and significant relationships to the innovation process. It was found that relative advantage and compatibility were both positively related and complexity was negatively related to the innovation adoption process (Al-Gahtani 2003). Rogers (2003) mentions five characteristics