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Abstract

Many service providers are now providing applications on the Web that encourage people to do business and satisfy information needs on the Web: educational, banking, shopping, library and medical. The proposed research attempts to investigate the evaluation of these Web-based information services. Three streams of literature are considered: usage of the Web, user satisfaction of the Web, and the complementary field of individual performance and the impact of information technology. Two models emerge from the literature which may be useful in attempting to measure the evaluation of the Web: The theory of planned behaviour and the technology to performance chain. The latter model is the preferred model as it emphasises the fit between technology and the task, an issue not considered by other models. Finally the paper reports on preliminary work investigating the dimensionality of evaluation and usage of the Web.

Introduction

Like most consumer products, Internet services for homes and small businesses will succeed only if they are easy to use, if their costs are affordable and predictable, and if customers perceive them as valuable. An important measure of the success of any information resource is the extent to which it is used by its target market. There has been much research investigating the level of usage and satisfaction of information systems within an organisational context. The Web however is an information system that has an enormous group of users who are not confined by an organisation context and for whom use of the Web is optional. It is the objective of this paper to present a theoretical model for measuring the impact of the Web by assimilating the issues that arise from a review of the research to date on Web satisfaction and the complementary field of individual performance and the impact of information technology.

The Literature

This section presents relevant research investigating the process of using the Web from a user perspective. The use of the Web as a communication medium and as a form of entertainment are two themes that arise from this literature. There has been some research into user perceptions of the Web to date, much of this work has been undertaken from a marketing perspective. Hoffman & Novak (1996) in addressing the role of marketing in hypermedia computer-mediated environments propose a broad structural model of consumer navigation of the Web. This model identifies constructs of individual usage of navigating the Web: characteristics of the user, the task, the experience of navigating the Web and the outcome: a positive experience, learning. The focus of this model is the concept of flow which is the interaction of the above characteristics. Flow is defined as the *"state occurring during network navigation that which is characterised by a seamless sequence of responses facilitated by machine interactivity, (2) intrinsically enjoyable, (3) accompanied by a loss of self consciousness, and (4) self-reinforcing. In the flow experience, which formalises and extends a sense of playfulness consumers are so acutely involved in the act of network navigation in the Web that nothing else seems to matter"* (Hoffman & Novak 1996, pp.57). Atkinson and Kydd (1997) found that playfulness is significantly associated with total Web use and that intrinsic motivations to use the Web were associated with frequent Web use for entertainment purposes. Eighmey (1997) considered two questions concerned with the benefits delivered by commercial Web sites as well as the approaches that deliver the greatest benefit. Three factors emerged, playfulness, clarity of purpose, and timeliness and the approach to presenting information. Overall Eighmey found that Web users are assisted by information placed in an enjoyable context. The "Homnet" study (Kaut et al., 1997) found that electronic mail use was more popular than use of the Web, more stable and drove continued use of the Internet overall.

Klobas (1995) tested the ability of three models of information resource use to explain the use of the Internet. The three models were: Information Use (Allen, 1977); Technology Assessment Model (TAM) (Davis, 1989); and The Theory of Planned Behaviour (Azjen, 1993). Klobas found that the Theory of planned behaviour best explained the use of the Internet. The good performance of the Theory of Planned Behaviour in the study showed that information resource use is motivated by similar factors to other human behaviours. This is an interesting finding as unlike other information technology the use of the Internet is not mandatory, it is voluntary, so it is appropriate then, that the use of the Internet is explained by the theory of planned behaviour.

Goodhue & Thompson (1995) present a model that incorporates valuable insights from two complementary

streams of research: user attitudes as predictors of utilisation and task technology fit as a predictor of performance. The essence of this new model, called the technology-to-performance chain, is the assertion that for an information technology to have a positive impact on individual performance, the technology must be utilised, and the technology must be a good fit with the tasks it supports. Goodhue & Thompson (1995) derive this model by analysing the limitations of two streams of research which have proposed models of technology use: utilisation focused research and task-technology fit focused research. While each of these perspectives gives insight into the impact of information technology on performance, each alone has some important limitations. Firstly, utilisation is not always voluntary. For many users system utilisation is more a function of how jobs or tasks are designed than the quality or usefulness of systems, or the attitudes of users towards using them. To the extent that utilisation is not voluntary, performance impacts will depend increasingly upon task-technology fit rather than utilisation. Secondly, models focusing on fit alone do not give sufficient attention to the fact that systems must be utilised before they can deliver performance impacts. Since utilisation is a complex outcome, based on many other factors beside fit (such as habit, social norms, and other situational factors), the fit model can benefit from the addition of this richer understanding of utlilisation and its impact on performance. This paper argues that the Focus of the Goodhue & Thompson model on the optional use of systems and success of usage being dependent on other factors apart from fit matches the environment of Web usage. The Web is a technology for which use is optional and at the same time utilisation is dependent on user perceptions of the impact of the Web on the task, which is dependent on many factors besides fit.

Research Issues

The technology-to-performance chain model uses a construct termed the task-technology fit (TTF) to measure the degree to which a technology assists an individual in performing his or her tasks. If the TTF model is to be applied to measure the performance impact of the Web on tasks a task-technology fit scale within the user context must be developed. The derivation of such a scale is the focus of the remainder of this paper by exploring the following sub-questions.

Q1.1 Can a scale measuring the task technology fit of Web usage be developed?
Q1.2 What is the dimensionality of a task technology fit scale for Web usage?

The TTF construct in the Goodhue & Thompson model is operationalised by a multi-item scale consisting of seven dimensions: **Quality** (current enough to meet needs, maintaining necessary data); **Locatability** (determining what data is available, ease of interpretation); **Authorisation** (obtaining authorisation to access data necessary to do my job)
Compatibility (data from different sources can be consolidated or compared without inconsistencies); **Production timeliness** (IS meets pre-defined production turnaround schedules); **System reliability** (dependability and consistency of access and uptime of systems); **Ease of use/training** (ease of doing what I want to do using system hardware and software)
Relationship with users (How well does IS understand my unit's business mission and its relation to corporate objectives?). To identify the dimensionality of a scale measuring the TTF of Web usage the following investigations were undertaken.

Method

The main objective of the research is to successfully derive a scale which identifies the perceived dimensionality of user's perceptions of the TTF of the Web. Focus groups would provide the researcher with a valuable insight into user's perceptions of Web usage as well as valuable artefacts that will be analysed to discover underlying factors indicating the perceived satisfaction/usefulness of the Web. To this end four focus groups were convened. The participants of the groups were undergraduate and postgraduate students of a major university. This sample is reasonable given that 42% of Internet users are aged 18 – 24 years of age and 56% of persons with a bachelor's degree used the Internet (ABS, 1998).

The questions asked at the focus groups were guided by the issues raised within the two models discussed earlier in the paper. To assist participants' focus on the tasks, one question related specifically to non-work based tasks. The transcripts of the focus groups were analysed using content analysis. To operationalise the content analysis, a taxonomy of Web usage was developed and applied by the researcher.

Results

Q1.1 Can a scale measuring the task-technology fit of Web usage be developed?

The output from the content analysis is a series of items that constitute an untested scale for measuring the TTF of the Web. Due to space limitations the items cannot be listed here. The number of items that have emerged from the content analysis demonstrate that the issues operationalised under the taxonomy are of interest to the sample that participated in the focus groups. The items have been grouped by the researcher using the taxonomy presented earlier. Regrouping may and should occur after testing of the scale using a multi-dimensional

technique such as factor analysis. Any discussion of the items at this stage may be premature.

Q1.1 What is the dimensionality of a task-technology fit construct for Web usage?

On observation the items do give some indication of the dimensionality of the TTF of the Web and the depth of the possible dimensionality of this construct. Some discussion of the groupings is offered below.

Communication/Keeping in touch

It was clear from the focus groups that communicating was fundamental to Internet usage. As well as didactic communication the Web was used frequently to access local and overseas news services. This confirms the findings of Kaut et al. (1997).

Web as an information resource/Quality/Genre distinctions

In considering the quality of the Web some interesting issues emerged. Users distinguished between the Web and other information services as well as differentiating between genres and sources of information on the Web.

Tasks/Mediation

On considering tasks undertaken on the Web two issues emerged: the Web provides wide support for technical computing information; the Web allows for mediation between users and providers of retail and other services on the Web.

Flow

The focus groups indicated that "flow" was part of the experience of using the Web for some users. Whether "flow" is an experience that is sustained by experienced users is not clear.

Cost

Within the focus groups cost did appear to be an issue that may limit time spent on the Web. Conversely the cost of the Web for communicating is considered less than that of the telephone.

Legal

Legal implications of using the Web were closely associated with the security of transmitting personal information over the Internet. Monitoring may change user behaviour.

Frustrations/usability/ease of use/locatability

Many of these issues are related to the technologies available to search the Web and their failure to meet the needs of users. The nature of Web sites, outdated links, the overuse of graphic/multimedia applications is perceived as reducing the overall effectiveness of the Web.

Conclusion

This paper has presented some perspectives as well as some research issues on answering the question: What is the impact of the information services of the Web? In attempting to answer this question consideration of the task for which the Web is used is mandatory due to the optional nature of Web usage. The model presented by Goodhue & Thompson may be the more appropriate model as it includes the construct of task, the optional nature of technology use and the nature of the fit between the use of technology and user tasks. In order to test the Goodhue & Thompson model for measuring the impact of the Web relevant and valid scales must be developed. The exploratory work presented in this paper demonstrate that it is possible to develop a TTF scale for Web usage and that such a scale would be multidimensional. The dimensionality of this scale may indicate user perceptions of the quality of Web usage for non-work based tasks. Further analysis needs to be undertaken to refine and confirm the findings presented in this paper.

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