UNIVERSITY OF TECHNOLOGY, SYDNEY
SCHOOL OF BUSINESS

A Model for Assessing the Perceived Value of Knowledge Based Systems

Jeffrey Clark

A Dissertation submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

1999

Certificate

I certify that this thesis has not already been submitted for any degree and is not being submitted as part of candidature for any other degree.

I also certify that this thesis has been written by me and that any help that I have received in preparing this thesis, and all sources used, have been acknowledged in the thesis.

Signature of Candidate

Production Note:
Signature removed prior to publication.

Acknowledgments

I would like to thank my principal supervisor, Dr Fawzy Soliman. His extensive knowledge of the role of advanced technology in the management of organisations was of invaluable assistance and provided the seeds of inspiration for the thesis. Without his direction, encouragement, patience, and indomitable optimism the task would have been considerably more difficult if not impossible.

I am grateful for the guidance and support of my co-supervisor, Professor John Debenham. His initial guidance was instrumental in providing a coherent foundation and focus to my PhD studies. His continual support in the form of numerous industry contacts was instrumental in locating a suitable case study for analysis. I am also grateful for his feedback on the numerous papers and drafts associated with the thesis.

I would like to thank the management and staff at CSIRO Division of Information Technology, Sydney for their cooperation in providing me with access to their industrial clients which led to recruiting Organisation X as the case study upon which this thesis is based. I am also grateful for the cooperation and time of the key informant and the staff at Organisation X.

Thanks also to Associate Professor Jenny Edwards, head of the School of Computing Sciences, at UTS who provided a supportive and conducive work environment as did her predecessor Professor Igor Hawryszkiewycz. I am also grateful to Professor John Hughes for his valuable advice, support, and guidance throughout.

My family and friends have been patient and supportive throughout the years of study and to them I owe a great deal. I especially would like to thank my parents for instilling in me the will and determination needed for the task. Finally, thanks to my children Louise and Thomas who are two outstanding reasons for seeing this through.

Table of Contents

List of Tables

List of Figures

Abstract

Knowledge Based Systems (KBSs) have the potential to automate a significant number of the decision making processes across organisations of all types. This represents a unique capability, not available to conventional information systems. It gives KBSs the potential to increase internal efficiency, and to enhance an organisation's competitive position. Despite these potential improvements, the impact of this capability upon an organisation introduces a host of new and complex management issues.

Strategic planning for the use of KBSs in organisations is recognised as an important, but neglected area of KBS management research. In practice, KBS development methodologies are used to guide KBS strategic planning. Historically, KBS strategic planning efforts have been poor and are linked to the very high incidence of KBS failure in organisations. While KBS development methodologies may be able to identify potential KBS projects, they are unable to identify which projects have the highest organisational value. The core of the strategic planning problem is that KBS development methodologies adopt current valuation models which do not adequately assess whether investment in a KBS is worthwhile. These valuation models are designed for use in the domain of conventional information systems, but are problematic when applied to KBSs. The unique capability of KBSs to make decisions generates numerous tangible and intangible costs and benefits which cannot be captured by these current valuation models. In addition, these current valuation models fail in three key areas that are critical for adequately assessing KBSs value. First, they do not provide disaggregated information on costs and benefits, many of which are peculiar to KBSs. Second they do not classify these costs and benefits into categories that are meaningful to managers making KBS investment decisions. Third, despite the fact that current valuation models cannot measure intangible costs and benefits, they do not utilise the perceptions of KBS employees to measure them. Using employee perceptions to measure intangible costs and benefits is valid if a recognised psychological model is used to measure perceptions of value.

A valuation model specifically designed for KBSs, which addresses these key areas, is needed by managers planning for an organisation's KBS strategy to enable them to identify KBS investments with the highest organisational value. The aim of this thesis is to propose and verify such a model. To achieve this, the case study research methodology was used. The chosen case is a large sales and manufacturing organisation. At the time of study this

organisation was developing three KBSs and was interested in being able to measure the relative value of the systems.

The study found that the proposed KBS valuation model presented in this thesis overcame the inadequacies of current valuation techniques. First, the results indicate that value of a KBS to an organisation can be assessed by measuring KBS value perceptions of three key employee groups involved in the KBS lifecycle. These groups were found to be: KBS project managers; knowledge domain experts; and KBS users. Employee perceptions of KBS value were measured by adapting the Theory of Reasoned Action (TRA) which reliably produced valid measures of perceived KBS value. Second, the results indicate that the KBS value perceptions were able to be expressed as disaggregated tangible and intangible costs and benefits. Third, these disaggregated costs and benefits were able to be classified into three categories of value found to be common to all KBSs and meaningful to management. These categories are: time; finances; and quality. Finally, a new graphical technique, termed a "KBS value graph", designed to visually portray to managerial decision makers, the perceived value of a KBS was developed. It lucidly portrays perceived KBS value while supporting the three critical areas of KBS valuation.