

e-Commerce as Knowledge Management

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Introduction

Research shows that many consumers use the Internet to *research* products before purchasing through a more traditional channel, 'integrating e-Commerce services into their current consumption practices rather than rethinking the way they shop' (Lunt, 2000). This suggests that a company's web presence needs to be more than just another retail channel. 'Where previously it was the location that attracted customers, now it's the awareness, reputation and emotional values that the seller builds up, communicates and exploits' (De Kare-Silver, 2000). The Internet is unique in facilitating this communication process. Businesses and consumers can now interact and share information and experiences or *knowledge* in ways that could not be realised in traditional retail channels. By leveraging the potential of electronic channels to build communities, interact with consumers, and facilitate the creation and exchange of knowledge, companies can successfully create loyal and receptive customer bases.

This paper outlines a research project that will explore the relationship of e-Commerce and Knowledge Management. Drawing on the theory of the 'personalization strategy' and on the 'socially constructed models' of Knowledge Management identified by McAdam and McCreedy (McAdam and McCreedy, 1999) it constructs the concept of e-Commerce as Knowledge Management and proposes the following research objectives:

- To explore the relationship between an organisation's level of Knowledge Management awareness and the effectiveness of its e-Commerce facility.
- To explore the idea that consumers currently use the e-Commerce facility to create, communicate and exchange Knowledge.
- To develop a 'best practice' framework for e-Commerce propositions

Knowledge Management

This study will focus on socially constructed models of the Knowledge Management process as defined by McAdam and McCreedy (McAdam and McCreedy, 1999). This method of Knowledge Management does not assume one given definition of knowledge, but adopts a more holistic approach linking knowledge to social and learning processes. This holistic view allows the models to 'be used to represent the key dimensions of Knowledge Management in the widest possible sense' (McAdam and Reid, 2000) and

therefore renders them suitable for a consumer-focused exploration of e-Commerce as Knowledge Management.

The model that will be adopted is a version of Demarest's (1997) adaptation of Clarke and Staunton's (Clarke and Staunton, 1989) model, modified by McAdam and McCreedy (Fig.1) (McAdam and McCreedy, 1999). This model emphasises four stages in the Knowledge Management process, 'knowledge construction', 'knowledge embodiment', 'dissemination' and finally 'use', but it adds 'emancipatory enhancements' through employee use of knowledge and subsequent empowerment. The model will be adapted to adopt a consumer focus in order to explore *consumer* empowerment through knowledge use.

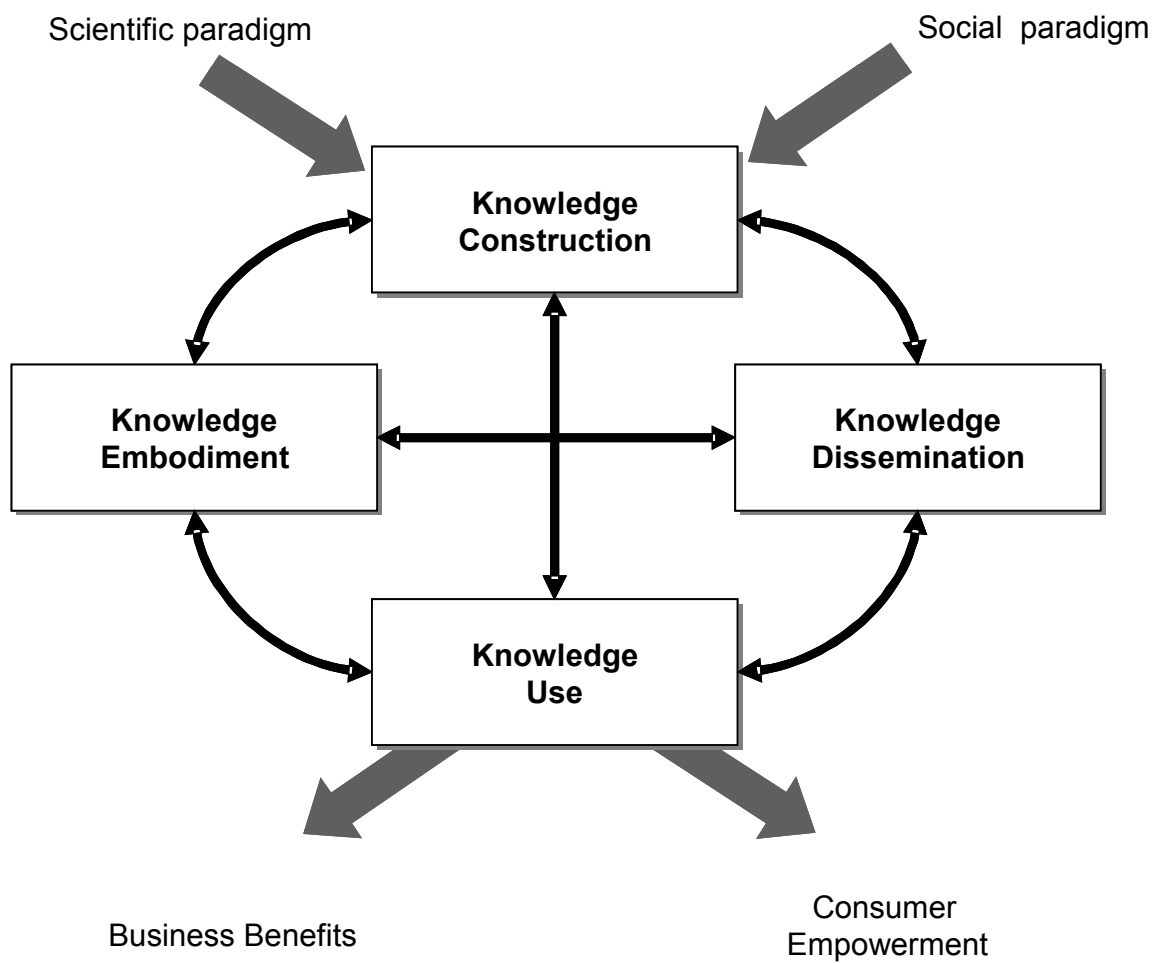


Fig.1. Socially Constructed Model of Knowledge Management.
Adapted from McAdam and McCreedy to include consumer empowerment
(McAdam and McCreedy, 1999)

The Internet and e-Commerce

The Internet

Perspectives and definitions of the Internet are multi-disciplinary, eclectic and plentiful. Researchers and academics from various fields including technology, information systems and social sciences have attempted to define the phenomena of the Internet. Two approaches to researching the Internet can be clearly identified; the information retrieval or 'Information Superhighway' view, and the communications view.

‘...research on the Internet generally divides into two main categories.... The first has to do with the abilities to search and retrieve data from large data stores ...The second research area is into the interactive communication capabilities of the Internet.’(Costigan, 1999).

Since the development of the World Wide Web (WWW) in 1989 and navigation browsers in 1994, the Internet has facilitated access to information held globally through an ever increasing and uncontrolled volume of web sites, currently estimated to be between fifty and sixty million. However, it is argued that the World Wide Web has brought about an information boom and will ultimately lead to information overload. ‘The sheer volume of information has made the access of this information almost impossible’, (Costigan, 1999) and has led to the view that ‘the Internet is not an information highway; it is in reality only peripherally about information.’ (Jones, 1999)

Communication theorists offer a contrasting view, proposing that it is in the interactive communication capabilities - e-mail, chat rooms, MOOs (multi-user domains object oriented), MUDS (multi-user domains or multi-user dungeons) - that the value and impact of the Internet lie.

‘The Internet is a social space, a milieu, made up of and made possible by, communication.’ (Jones, 1999),

it is a

‘...computer network system that directly supports the interaction of people with other people’ (Kollock and Smith, 1999).

It is generally agreed that ‘technology has its most profound effect when it alters the ways in which people come together and communicate’ (Kollock and Smith, 1999). Through e-mail, IRC (inter-relay chat), MOOs and MUDs, newsgroups and even simple hypertext links, the Internet has dramatically changed the ways in which individuals and organisations communicate. It is often noted that the Internet is ‘greater than the sum of its parts’ (Costigan, 1999). It is evident that the Information Superhighway and the interactive communication features of the Internet have great synergistic value. In facilitating communication, which is neither time nor spatially dependant, the Internet

creates a continuous global forum for the creation and exchange of information and experiences or knowledge.

As Slevin notes:

‘The Internet has expanded at a phenomenal rate, integrating various modes of conventional communication including radio and television into a vast interactive network. Its use has already reshaped the conditions of mediated experience for many millions of individuals and many thousands of organisations throughout the world It opens up new opportunities for dialogue and deliberation, empowers people to make things happen rather than have things happen to them, and facilitates new forms of solidarity and cooperation.’ (Slevin, 2000).

Kollock illustrates this. Building on Rheingold’s suggestion that online communities, operate a ‘gift economy’ he argues that ‘there are fundamental features of online interaction which change the costs and benefits of social action in dramatic ways’ (Kollock, 1999):

‘In comp.lang.perl, a discussion group devoted to the computer language Perl, participants routinely help others out with their technical questions and contribute new computer code for others to use. An accomplished Perl programmer can charge \$75 per hour. In a number of discussion groups for lawyers, participants routinely offer each other detailed legal advice concerning cases on which they are working. The lawyers report that they often refuse to give similar information over the phone or charge up to several hundred dollars an hour for the same advice.’ (Kollock, 1999).

The Internet not only changes the physical way in which we communicate, it changes the social dynamic and the very content of *what* we communicate. This has great implications and potential for the Knowledge Management process.

In 1994 Berners-Lee et al noted that:

‘The world-wide web was developed to be a pool of human knowledge, which would allow collaborators in remote sites to share their ideas and all aspects of a common project The Web does not yet meet its design goal as being a pool of knowledge that is as easy to update as to read. That level of immediacy of knowledge sharing waits for easy to use hypertext editors to be generally available on most platforms.’ (Berners-Lee et al., 1994).

In 2002, it is evident that this goal could now be achieved.

e-Commerce

As an emergent and multidisciplinary field, definitions of electronic commerce are plentiful and diverse. 'The term *electronic commerce* is poorly understood and frequently used to denote different meanings, very often depending on the individual's job function, professional orientation and background, focal product or service, and type of information technology deployed.' (Wigand, 1997). Similarly, Holsapple and Singh note that 'the EC (electronic commerce) landscape Is characterized by a great variety of topics, diversity of functional orientations and lack of definitions' (Holsapple and Singh, 2000).

The term electronic commerce emerged in business fields in the 1970s and grew to encompass business conducted by telephone or fax, electronic funds transfer (EFT), and electronic data interchange (EDI); essentially business-to-business transactions. With the rise of the Internet and particularly the development of the World Wide Web electronic commerce as a consumer channel has evolved. Possibly due to roots in the business world, the terms e-Business and e-Commerce are often used interchangeably. However, the terms have developed and defused and there is now a general accordance that:

'E-business embraces all aspects of the use of information technology in business. It includes not only buying and selling, but also servicing customers and collaborating with business partners. The narrower term, e-Commerce .. focuses on marketing or business transactions' (Rowley, 2000).

and:

'Electronic commerce is an emerging concept that describes the process of buying and selling or exchanging of products, services, and information via computer networks including the Internet' (Turban et al. 2000).

In the initial start up period two clear approaches to developing an electronic presence emerged: the *Informational* approach and the *Transactional* approach. The Informational approach focused on building brand presence, and informing the consumer's buying decision, while the transactional approach focused on facilitating the retail process - exchange of product or service for financial value. There was a general belief that a transactional approach offered greater competitive advantage. This can be seen in the surge in virtual companies or 'dot coms', and in the numerous early definitions of e-Commerce that focus on electronic transaction alone:

'EC provides the capability of buying and selling products and information on the Internet and other online services' (Kalakota and Whinston, 1997; Kalakota and Whinston, 1997),

'EC is the use of computer networks to conduct business - basically the buying and selling of goods and services - electronically with one's suppliers customers and / or competitors.' (Hayashi, 1996).

This 'Trading View' (Holsapple and Singh, 2000), or transactional approach offers limited leverage of the potential of electronic commerce and may account for the number of failed virtual start up companies.

More recent attempts to define e-Commerce are more eclectic:

' (EC) is an approach to achieving business goals in which Internet technology enables or facilitates execution of activities in and across value chains as well as supporting decision making that underlies those activities' (Holsapple and Singh, 2000).

and:

'... allows businesses to identify and communicate with a far wider range of potential consumers and even build an ongoing relationship with these consumers, based on their enquiries and historical purchasing habits' (Marshall and Finney, 2000).

Researchers and practitioners of e-Commerce are beginning to recognise that commercial Internet sites need to be more than merely 'transactional' to succeed.

'A web site that provides a benefit to the users, like knowledge content starts the process of creating a community of value. Unobtrusively adding sales content to the site is the way your company grows.' (Smith et al. 2000)

Given that consumers currently use the Internet to research products and services, but frequently fail to complete transactions online, it is to a company's advantage to focus on areas other than the transactional function of their web sites. It has even been argued that e-Commerce should attempt to replicate the way people shop in the 'real world' and 'create a sense of community and opportunities to communicate' (IPA, 1995).

'Direct-to-consumer electronic commerce may not succeed, primarily because consumers will shun its perceived convenience for the social benefits of shopping in person and interacting with sales personnel and other shoppers. Some electronic providers have offered an alternative to social shopping by creating virtual communities' (Urbaczewski et al. 1998).

Research has suggested commercial benefits of online communities:

'There appear to be commercial benefits for organisations providing virtual communities on their Websites. Many ... people would like to use a virtual community to communicate with the company itself.' (Evans et al., 2001).

Electronic Commerce is still evolving, but it is clear that this new channel offers enormous potential for both consumers and businesses. Kozinets suggests that:

‘...a cultural battle is in the making. On the one side are consumers who are just beginning to unite online (and through it, in person) in order to assert social power, to unite and to claim symbols and ways of life that are meaningful to them and the communities they build. On the other are the marketing and other corporate industries who seek to understand these consumers, to address their concerns without "giving away the store" and also to understand how best to take advantage of the many opportunities the new information media (such as the World Wide Web) present as a vast forum for direct sales and advertising’ (Kozinets, 1999).

Enabling these two sides to interact has enormous potential for e-Commerce.

Conclusion

The Internet has dramatically changed the ways in which consumers interact with each other and with companies. In this more evolved definition of e-Commerce ‘information or content is not merely transmitted from a sender to a receiver, but instead, mediated environments are created by participants and then experienced’ (Hoffman and Novak T., 1997). This strikes resounding chords with the socially constructed model of Knowledge Management. The synergy of the Internet and Knowledge Management is vast. To explore the effect of building on that synergy the following research project is proposed.

Research Process

Figure 2 shows the six stages of research proposed.

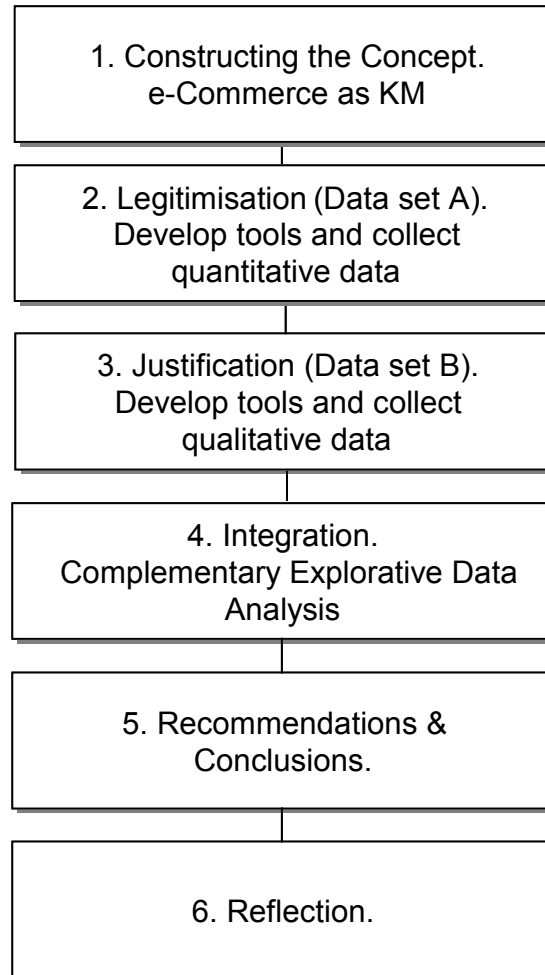


Fig. 2 Phases of The Research Project

Methodology and Study Design

Avison and Fitzgerald outline the importance of a philosophical approach in designing a research project,

‘A methodology is a collection of procedures, techniques, tools and documentation aids... but a methodology is more than merely a collection of these things. It is usually based on some philosophical view, otherwise it is merely a method, like a recipe.’ (Avison and Fitzgerald, 1995).

The purpose of this section is to outline the philosophical and practical aspects of selecting an appropriate methodology for research, and to justify the choices made in selecting a methodology for this study.

Philosophy

It is increasingly important for researchers to reflect on the research process, engaging with ontological and epistemological issues in selecting the most appropriate method of enquiry for the research question. The reflexive researcher should address the questions of *what* they are claiming to know (ontology) and *how* they are claiming to know it, or how they will justify that claim (epistemology).

In order to address these questions with some consistency the researcher must develop an awareness of their own epistemic perspective, and ascertain to which epistemic domain or paradigm they belong. Johnson and Duberley (Johnson and Duberley, 2000) offer a matrix for mapping the various approaches to undertaking research based on ontological and epistemological assumptions. (Fig.3)

As Kuhn argued, ‘there are no independent ‘facts’ upon which to choose between paradigms (Kuhn, 1970). The ‘paradigm wars’ (Tashakkori A. and Teddlie C., 1998) cannot be resolved by ‘proofs’ as there is no prior agreement on the assumptions adopted. It is rather a debate between social groups who speak different languages and use different assumptions. The reflexive researcher must select the paradigm that best suits their own beliefs and assumptions about the concept or field of enquiry they are to research.

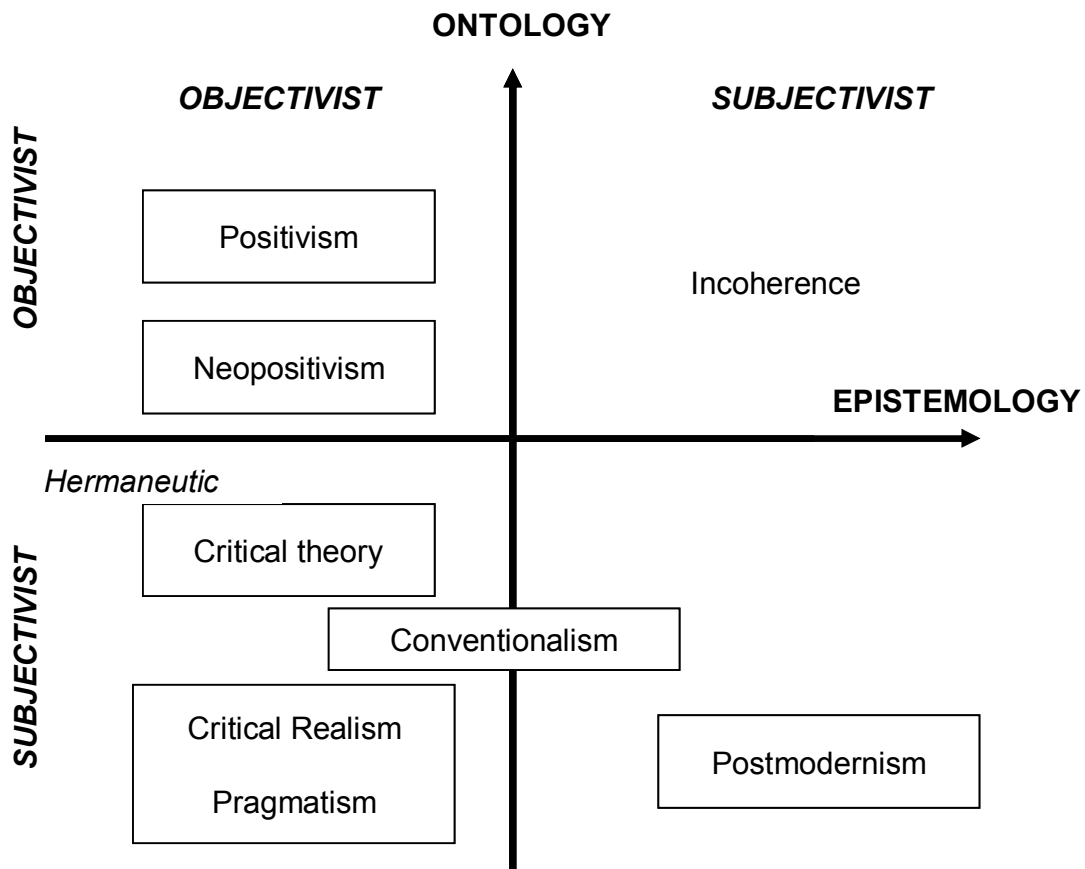


Fig.3 Epistemic Domains. Adapted from Johnson and Duberley, 2000

This research will analyse current practice in e-Commerce activity with the intention of exploring the idea that consumers currently use e-Commerce sites as a Knowledge Management facility. It will explore how effectively Knowledge Management tools and techniques can be applied in e-Commerce propositions from the user perspective. The research is driven by research questions rather than by hypotheses for example:

- Is there a correlation between strong Knowledge Management awareness and successful e-Commerce propositions?
- Do consumers currently use e-Commerce facilities as a Knowledge Management function?

These questions assume an objective reality, a reality that exists independently of our efforts to understand it (objective ontology). However, that reality cannot be wholly objectively observed. e-Commerce and Knowledge Management are social functions that can only be understood in terms of prior knowledge, values and expectations. The

epistemological stance that will be adopted in this research will be Positivist-Interpretive – direct centre on the left of the matrix offered by Johnson and Duberley. This approach is considered more appropriate than a purely Positivist approach as the research will be guided by the emerging phenomena and themes rather than by hypothesis testing. Similarly, this approach is more fitting than a purely Interpretive one as the research objectives will best be achieved through the combination of quantitative and qualitative data.

Multi-method research, or triangulation, employs a combination of research methods and tools to collect both quantitative and qualitative data. Although it is argued that researchers cannot be scientific (Positivist) and hermeneutic (Interpretive) simultaneously (Burrell and Morgan G., 1979), used appropriately methodological pluralism can counteract the weaknesses of each epistemic approach (Willmott H., 1993; Gioia D. and Pitre E., 1990). Indeed, it has been argued that in the emergent field of new media ‘scholars need to use multiple methods, including more qualitative methods of data gathering and analysis and interpretive approaches’ (Williams et al. 1988).

Research Phase 1

Legitimation: Validating the claim (Data Set A)

e-Commerce Site Analysis

Informed by a literature review and desk based research, a Knowledge Management coding sheet will be developed and used to analyse the contents of a sample of e-Commerce sites for features which enable the creation and exchange of knowledge. Content analysis is ‘the systematic and reliable coding of communication content into a theoretically meaningful set of mutually exclusive and exhaustive categories’ (Williams et al., 1988). In this case the content will be analysed quantitatively as frequencies of knowledge creation and exchange tools.

Questionnaires

A Likert scale questionnaire will be sent out to the e-Commerce Managers of the same sample of companies to determine the level of Knowledge Management awareness within the department. It is recognised that the response rate to postal questionnaires is generally low. Multi-method research or triangulation will ensure adequate data collection. The data gathered will be analysed to explore the relationship of strong or weak Knowledge Management perspective or awareness to the success or failure (as defined by site intention, usage figures, and subscriber numbers) of an e-Commerce facility.

Sample Selection

A purist Positive approach would dictate that a sample used in quantitative research should be a probability sample taken objectively and without bias. However, from the Positivist-Interpretivist stance that this study will take, it is important to survey a range of companies showing varying levels of Knowledge Management awareness. A non-probability, purposive sample will be selected from UK multi-channel retail companies based in the North West of England in the 'Clothing' (SIC¹ 5242) and 'Mixed' or 'Department Store' (SIC 5212) sectors as defined by *Retail Directory of the UK (Healey and Baker, 2000)*. Clothing and Department Stores were considered to represent both a product group and a range of retailers that are familiar to the majority of consumers. The sample will include a range of national High Street retailers and small local companies enabling comparisons within the retail sector selected.

Due to time and cost restraints in such a small scale research project it is not possible to survey a large sample from a range of retail sectors or geographic locations. However, surveying a sample of companies from a specific sector and geographical region will facilitate comparison and reduce variables between product groups. Similarly, in small scale research access to companies is a major barrier. Preliminary research suggested that companies in the sector selected would be willing to participate.

Robson states that,

'The principle of selection in purposive sampling is the researcher's judgement as to typicality or interest. A sample is built up which enables the researcher to satisfy her specific needs in a project' (Robson, 1993).

The 'specific needs' of this phase of the research are a range of e-Commerce sites with varying levels of Knowledge Management facilities. The method will be to analyse the contents of a sample of e-Commerce sites for features that enable the creation and exchange of knowledge, and subsequently to explore the relationship of strong or weak Knowledge Management perspective or awareness to the success or failure of an e-Commerce proposition. Given this, the sample size cannot be predetermined, but will be built up to include a range of companies with differing levels of Knowledge Management awareness. The purpose of this research is not to enable generalisation from sample to population, but to uncover emerging theories that will be transferable to other retail sectors and e-Commerce sites. Therefore the significance of poor generalisability resulting from purposive sampling is greatly reduced.

¹ Standard International Code of the industry type

Research Phase 2

Justification: Weights and associations (Data Set B)

e-Commerce Site Analysis

In this phase knowledge sharing forums within e-Commerce sites will be observed. Content analysis will be qualitative in order to develop an understanding of the use and form of the content of these forums. A major strength of content analysis as a research method in new media is that, 'it provides a theoretical connection between the intentions of the individuals or organizations producing media content and possible social consequences related to audience use of that content' (Williams et al.1988). Grounded Theory will be drawn upon to analyse the data and develop themes.

Semi-structured Interviews

The results of phase one of the research will be crosschecked against the consumer experience through semi-structured interviews with consumers. To ensure consideration of stable usage patterns the sample will be made up of consumers who are experienced Internet users and *have* engaged in commercial activity (transaction, product / company research) on the Internet for at least one year.

Semi-structured interviews with consumers exploring their experiences of online interaction will provide qualitative data that will be analysed in relation to the research question 'Do consumers currently use e-Commerce as a Knowledge Management function?'. Focus groups are often used in new media research, and were considered for this study. However, it was decided that as e-Commerce is essentially a solitary activity where group approval and group dynamics develop electronically and with a degree of anonymity through computer mediated communication, one to one interviews would be the most appropriate way to access the interviewees experiences.

Grounded Theory, a method of data collection and analysis developed by Glaser and Strauss (Glaser and Strauss, 1967), will be drawn upon to analyse qualitative data. In this method, themes and categories may be 'discovered' or generated from the data by following a number of guidelines and procedures. Grounded Theory is 'concerned with discovering theory that is grounded in social settings' (Hughes and Howcroft, 2000). There is a direct and perceivable trail from theories and conclusions made by the researcher back to the data they derive from. Although 'purists' argue that Grounded Theory, or indeed any methodology, should be meticulously and rigorously applied (Glaser and Strauss, 1967), (Turner, 1983), others have noted that the flexibility enabling selection and use of different aspects of Grounded Theory 'represent its usefulness as a pragmatic tool for qualitative research' (Hughes and Howcroft, 2000). For this reason Grounded Theory is considered an appropriate method in this research project.

Sample Selection

A purist Positivist approach would dictate that a sample used in interview research should be a probability sample taken objectively and without bias. However, from the Positivist-Interpretivist stance that this study will take, it is important to survey relevant groups with 'high experience levels of the phenomena under study' (Pettigrew, 1990), in this case online shopping. With this type of study it is difficult to identify relevant groups as online shopping is a solitary activity that any individual could potentially engage in. For this reason the following methods of sample location will be used.

The sample of respondents will be a non-probability purposive sample located through the following methods:

1. Electronic posting to members of The University of Salford and Liverpool John Moores University (Including academic and support staff, and students.)
2. General networking with other consumers
3. Snowball sampling. Using respondents as informants to identify other members of the population.

Robson (Robson, 1993) states that non-probability samples 'typically involve the researcher using her or his judgement to achieve a particular purpose' and 'are acceptable when there is no intention or need to make a statistical generalization to any population beyond the sample surveyed'. Purposive sampling is particularly suited to grounded theory analysis where researchers carry out initial sampling and the sample is extended as a result of the emerging theories. In grounded theory the approach is towards 'theoretical sampling' rather than 'representative sampling', and generalization is based upon underlying theories rather than representative samples.

Although these methods of sample location inevitably show geographic and demographic bias, they are particularly useful where the activity is dispersed across the population making the identification of relevant respondents more complex and where respondents with a certain level of experience are sought.

Sample Size

Sample size is a contentious issue. The sample must be large enough to enable generalization, yet not so large as to dilute the 'rich picture', or bring about 'data overload'. Grounded theory analysis provides a useful framework on which to build. There is no pre-set limit on the sample size, instead researchers continue to expand the sample until nothing new is emerging from the interviews and a state of 'theoretical saturation' (Glaser and Strauss, 1967) is said to have been reached. Similar studies have worked on an initial selection of around thirty respondents with a degree of flexibility

dependent on reaching theoretical saturation (Howcroft, 1998). On this basis the initial sample for this study will be set at thirty respondents.

Integration

The quantitative data (Data Set A) and qualitative data (Data set B) will be integrated using the Complementary Explorative Data Analysis (CEDA) framework. Traditionally in multi-method research the qualitative and quantitative data are regarded as mutually exclusive components.

‘One component is unstructured textual data of a phenomenon being investigated..... analyzed with an interpretive or hermeneutic method. The other component is numerical data of the same phenomena..... analyzed with some statistical procedure’ (Sudweeks and Simoff, 1999).

Sudweeks and Simoff argue that in the field of Internet research the data collected are ‘a heterogeneous combination of quantitative measurements and qualitative observations’. This belief prompted the development of the CEDA or Complementary Explorative Data Analysis framework,

‘a dynamic framework that provides valid integration of both methods. CEDA employs quantitative methods to extract reliable patterns, whereas qualitative methods are incorporated to ensure capturing the essence of the phenomena’ (Sudweeks and Simoff, 1999).

The most significant feature of the CEDA framework is that ‘it allows the use of different data sets in a common research cycle rather than the traditional approach of applying different analysis to the same data set.’ (Sudweeks and Simoff, 1999). It is for this reason that the CEDA framework has been selected to analyse the data collected in this research (Fig 4.)

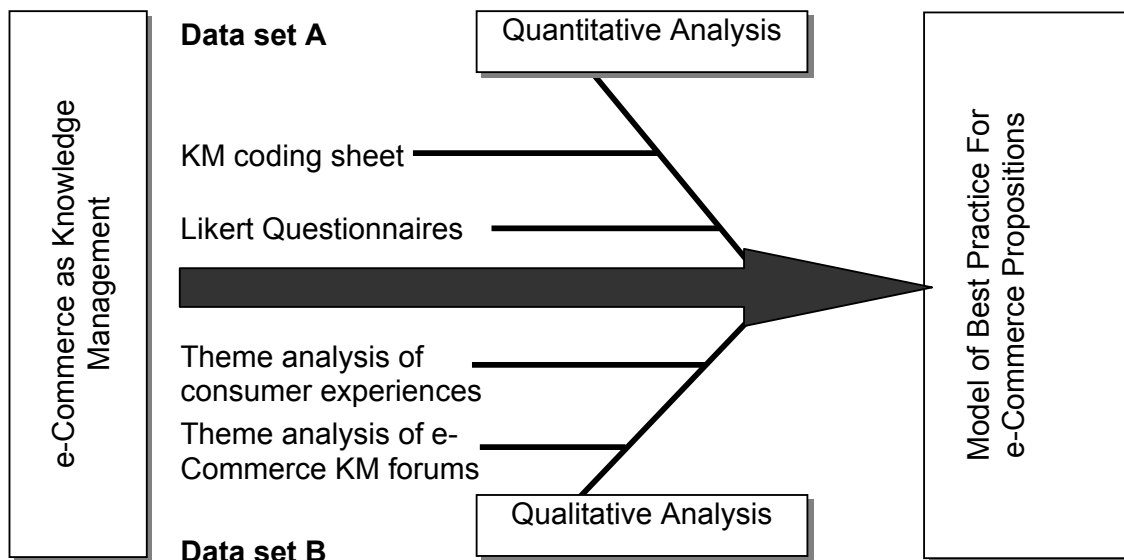


Fig. 4 Application of the Complimentary Explorative Data Analysis Framework.
Adapted From Sudweeks, 1999

Accuracy

Role of the Researcher and Researcher Bias

It has already been established in the outline of the philosophical stance taken in this research (*Methodology and Study Design*) that the researcher is not entirely objective, but brings to the study a set of beliefs, values and experiences. According to the Interpretivist tradition all research is value-laden as the researcher makes subjective choices in methods of data collection and analysis. Given the methods of data collection to be used in this research the researcher's role will be one of outside observer, not immersed in, yet certainly not objectively detached from the research subjects. It is worth reflecting upon the researcher's own experience and its role in informing the study. In fact the grounded theory approach actively recognises the positive contribution and insight that the researcher's own experiences can bring.

Validity, Reliability and Generalisability

Reliability is defined by a number of writers (Bell, 1999; Ryan and Bernard, 2000) as the extent to which a given procedure produces similar results on other occasions given similar conditions, or, the possibility of the research producing the same results if repeated. Those researching into new media 'must confront serious challenges to reliability and validity' (Williams et al. 1988). Interpretivists generally question the extent

to which social research could produce the same results on other occasions. In new media research involving not only the study of social interaction, but interaction through an unpredictable medium (differing download times, expired web sites, connection problems) an experience is not replicable.

This also carries implications for the generalisability of new media research. Generalisability refers to the degree to which findings are 'applicable to other populations or samples'. Without replicability it is difficult to generalise from a sample to a general population. However, it is not the aim of this research to make generalisations. The aim of the research is suggestive rather than determinative.

Conclusion

A literature review has revealed little work on the use of Knowledge Management techniques in e-Commerce from a consumer perspective. Whilst statements such as:

'An example of a web site offering excellence in the form of quality of information is the UK health and beauty retailer, Boots the Chemist (www.wellbeing.com) who provide detailed information about their products, offer health advice in the form of 'ask the pharmacist', and also produce a 'good hospital guide' (Murphey,).

touch on the relevance of this issue, very little research into this area exists.

Holsapple and Singh propose that 'future research should investigate what activities in the conduct of KM are potential sources of competitive advantage via e-Commerce' (Holsapple and Singh, 2000). Similarly, primary research with retail companies highlighted a need for research into site 'stickiness' or building and maintaining relationships with consumers who are one click away from the competition. This research will meet this need addressing many of the theoretical, practical and methodological issues surrounding Internet research generally, and more specifically research into the value of Knowledge Management techniques for e-Commerce.

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