An analysis of adoption and diffusion patterns of videoconferencing at a public sector company

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ABSTRACT

The globalisation of entities has meant that innovative ideas need to be implemented in order for businesses to grow but also to reduce costs thereby affecting the profit margins positively.Technology has advanced to such a degree that it has increased the capability to process more demanding algorithms for both video and audio technologies. This study is intended to enable a deeper insight into the adoption and diffusion patterns of Video Conferencing (VC) technologies within a public sector company, Company X, with a focus on the factors that impact users perceived quality and trust as well as the intended use of this technology. It is for this reason that the focus of the study is to analyse the adoption and diffusion patterns of the new technology of VC in Company X.Data was gathered with the use of both quantitative (questionnaire) and qualitative (interview) with a sample of 180 employees and three middle managers respectively. In addition, observations were conducted over a period of three weeks to triangulate data that was collected. The study established that users adopted and diffused technology to a limited degree.Use of the technology was between 1 to 5 hours each week predominantly for meetings. The participants also mentioned that travel time is saved, hence there was more personal time and also more time gained for the completion of collaboration tasks more quickly. However, some staff preferred the face to face approach during meetings. The majority indicated that using the facility during VC was complicated and at time disruptive due to insufficient training. Based on the results of the primary study and literature, recommendations were formulated for management.

Introduction

The new cadre of business operations focuses on cost reduction and improved efficiency without hindering the globalisation of business engagement. The globalisation of entities has meant that innovative ideas need to be implemented in order for businesses to grow but also to reduce costs thereby affecting the profit margins positively. Although most companies use technological innovation to enhance profit (for example, parastatals and companies registered in terms of Section 21 of the Company's Act), some organisations use these technologies to reduce costs in line with the Public Finance Management Act (PFMA) Act No 1 of 1999 to get best value for public funds.

Background of the Study

Company X is a South African development agency that offers programme management to government departments and other development partners and development advisory services aimed at the eradication of poverty in South Africa. Their emphasis is on the eradication of chronic intergenerational poverty, especially among the rural poor. The Company X is a Schedule 2 Public Entity established in 1990 as a development management agency. The Company X has a mandate to contribute to the government's effortsto meet its social mandate to alleviate poverty by improving the quality of life of those living in poor rural communities (Company X, annual report).

Company X has a national presence in the form of regional offices in all nine provinces and a head office in Pretoria totalling ten offices across South Africa. It services the sector departments and private companies within all nine provinces in the country. To this end, communication is a vital part of the service delivery requirement in the project management environment. Company X used conventional methods of communication such as electronic media, telephone, memos, facsimile and face-to-face meetingsas a standard means of communication and interaction. Subsequently, in October 2009 Company X adjudicated a tender for the purchase, installation and implementation of a VC solution.

Until recently, as cited by Hamers (2010: 17) VC remained in the domain of very few businesses. This was largely due to the high cost of system maintenance (Cobbley, 1993: 501). Hamers (2010: 17) further cited that although there were many issues that hampered VC adoption in the past, the technology has evolved and is now widely accessible. Technology has advanced to such a degree that it has increased the capability to process more demanding algorithms for both video and audio technologies. User experience is now better than ever before.

Hamers (2010:36) citesAllan (2008:2), who explains that John Short, senior product manager at BT Conferencing, states that "high performance internet protocol networks are enabling new technological advancements in speed, quality and ease of use in the conferencing arena to become reality". Organisational implications and potential benefits of these new VC systems extend far beyond cost cutting mechanisms and decreased time spent in meetings. The technology now affords organisations the capability of engagement in key day-to-day activities, including information gathering and dissemination, training,

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brainstorming, interviews, distance collaboration and distance learning.

This study is intended to enable a deeper insight into the adoption and diffusion patterns of VC technologies within Company X with a focus on the factors that impact users perceived quality and trust as well as the intended use of this technology.It is for this reason that the focus of the study is to analyse the adoption and diffusion patterns of the new technology of VC in Company X. The adoption theory perspective allows for deliberation of factors that impact upon the user's perceived quality and trust as well as the intended use of the new meeting format.

As per the financial statements of the Company X, one of the largest expenses at the Company Xwas travel related expenditure. As part of cost cutting, the Company X investigated the implementation of a VC solution in the quest for reduction of operational costs. The decisions that lead to VC within the Company X include that of cost reduction, to establish and maintain collaboration between workers and regions and the ability to assemble large groups of people from geographically dispersed regions on a regular basis. Added to this, the system would hopefully assist in decreasing the cost in travel expenditure and improve and expedient the decision making process.

The factors that led to the implementation of VC within the Company X were as follows:
● The executives would be able to conduct regular management meetings;
● Key decision makers could be reached whenever required;
● Seminars/training could be conducted without travelling and this invariably improved work/life balance;
● Human Resources (HR) could interview candidates from afar and conduct ongoing training; and
● The Finance department could use VC to collaborate in real time, set daily strategies, share news and market conditions and make decisions without confusion and offer training and consulting opportunities.

Problem Statement

The increasing globalisation of businesses and the reliance on cross functional teams across organisations within a business have placed demands on managers' abilities to coordinate distributed business activities. Following the global economic downturn in 2008 (Anup Shah, 2010: 23), private and public sector executives needed to confront the challenges of service delivery with an increasing focus on cost reduction. Increasingly, however, groups of experts were dispersed and not all members were able to meet regularly or work together. It was therefore often challenging to establish and maintain collaboration. To avoid this dispersion due to geographical locations, meetings and workshops needed to be conducted in order to facilitate the sharing of ideas and learning. Due to the challenging economic environment, it was financially prohibitive to assemble large groups of people from geographically dispersed regions on a regular basis.

The face-to-face (FTF) meetings are the most costly form of communication media at Company X as these involve huge expenses related to travel and accommodation. With the capital base of the Company X quickly eroding, the management of the Company X needed to start looking at cost cutting mechanisms in the second half of 2008 in order to become financially viable. One of the largest expenses the Company X incurred was travel-related expenditure hence all travel budgets were reduced across the company and strictly monitored. As part of cost cutting measures, the Company X investigated the possibility of implementing the VC technology solution in its quest to reduce operational costs.

Aim of the Study

This study aims to analyse the adoption and diffusion patterns of new technology, namely videoconferencing, in a public sector company in South Africa. By taking an adoption theory perspective, the focus is on factors that impact users' perceived quality and trust as well as intended use of this new meeting format.

Research Objectives

The research uses factors established through research as critical for effective technology adoption and diffusion to establish the effectiveness of VC by the Company X, as a case study. The objectives of the research are:
● To assess the adoption and diffusion patterns of video conferencing technology (VCT) within the Company X;
● To determine the perceptions of the staff within the Company X regarding the factors for effective VCT adoption and diffusion;
● To determine how the Company X can ensure rapid migration to VCT adoption;
● To assess the reasons why staff are reluctant to use VCT;
● To determine the financial impact that the VCT adoption had on travel-related expenditure; and
● Provide recommendations on increasing VCT use and improvements to the process.

Literature review

This section reviews the literature on adoption of technology, the acceptance model, innovation and diffusion of the technology, return on investment and the successful implementation of VC.

Videoconferencing

VC is a method used in communication that involves video and audio input and output devices which results in a two way real time communication between people in various locations. This may be as simple as a conversation between two people in private offices or involve several locations with more than one person at different sites. The use of VC technology is largely dependent on the costs of the technology.

Requirements of VC systems over IP

There are many issues that organisations have to address in order to meet the requirements of a VC system over IP. These include but are not limited to security, scalability and system heterogeneity (Hamers, 2010: 36). Hamers (2010: 36) assert that the key requirements of VC are: source transmission patterns; performance requirements; adaptability; group characteristics; and session lengths.

Hamers (2010: 36) is of the view that internet access is the most important technical issue in terms of VC technology, specifically the upload and download capabilities of the LAN or wide area network (WAN) networks. Audio and video lags occur when high bandwidthis not maintained. The participants of VC often complain about the temporal gap of responses which are delayed by the network transmission involvingVC systems, even if the temporal delay is about half a second. This temporal delay thus presents challenges to the process whereby the VC does not promote natural interaction as the actions, conversations and motions of the participants are presented with a time lag and disputes the natural turn-taking of a conversation (Kawashima, Nishikawa, Matsuyama, 2008: 258).

VC technology has not succeeded in being adopted and diffused into a standard communication norm. This was initially due mainly to the quality of audio and video live stream, which was not satisfactory. Recently, VC quality is very good but the

cost of this quality is very high (Hamers, 2010: 38). According to Hamers (2010:38) organisations are concerned when they hear about the high investment costs of equipment and the adverse technological requirements. A significantrecent development is that most major software companies are integrating VC with existing software programs of organisations. As a result the barriers to adoption and diffusion of VC will be lower because users can choose which communication method will be applied to transmit the information; the cost of systems will be cheaper; and result in an easier access to VC (Hamers, 2010: 39).

Types of Videoconferencing

There are various types of VC equipment and systems available. These include:telepresence which closely resembles a live meeting; room-based VC systems featurelarge VC screens fixed to the walls of meeting rooms; desktop VC resides on desktop computers, laptops and other devices such as IP phones, for individual use and Hybrid VC systems combine telepresence and room-based conferencing which overlap.

Technology Adoption

One of the most challenging issues for organisations wanting to adopt and exploit new technologies is to understand why a workforce adopts or rejects new technologies. Research by Abukhzam and Lee (2010: 60) has shown that a crucial element in the implementation of new technology projects is workforce perception of, and attitude towards, new technology. The primary consideration of a workforce in new technology adoption is if staff will perceive that the new technologies will decrease work time and process or if its adoption will not affect their positions, then they will adopt it (Abukhzam and Lee, 2010: 60).

Insights from Prior Studies

According to Denstadli, Julsrud and Hjorthol (2012:70), the VC market has grown substantially during the past 20 years, in the period from 1991 through to 2006. Intra organisational contact has been a prime motivator for the use of VC within organisations, thereby implying that VC technology serves mostly as a communication tool for large, multiunit companies. Due to high investment and user costs, this technology is far less feasible for smaller companies.

Denstadli et al. (2012:71) alludes that although there has been substantial growth in the rate of diffusion of VC technology, studies in business communication have shown that FTF meetings are still unavoidable in many situations. Earlier literature on VC was optimistic about the potential to reduce business travel, but recent studies have been more cautious in this regard due to factors such as task complexity and the particular type of knowledge involved, making co-presence unavoidable for many business meetings in today's knowledge-driven economy (Denstadli et al., 2012: 71). The most pertinent question for organisations is not only about whether VC can substitute for FTF meetings but is rather about what factors influence the choice between VC and FTF meetings and the factors that influence adoption of the technologies.

Denstadli et al. (2012:71) have stressed the context of the meeting as the key factor influencing the choice between VC and FTF gatherings (that is, those that would require participants' air travel). The results from their survey indicate that VC is chosen for contexts such as information exchange, management and training and consulting whereas FTF meetings are chosen for contexts such as negotiations, marketing demonstrations, and business discussions. A Swedish study has indicated that virtual meetings may be best for ''follow-up and information tasks'' as well as for short and repetitive meetings (Arnfalk and Kogg, 2003: 865). Corresponding results were reported by Denstadli et al. (2012: 71), who found that VC's have less complex content than do FTF meetings, which often involve informal and unstructured negotiations.

In research conducted by Abukhzam and Lee (2010: 60), it is indicated that successful adoption and full implementation of any new technology will not be achieved unless the workforce accepts the technologies an organisation introduces. Adopting a particular technology depends on many factors that contribute to the success or failure of IT adoption in organisations. Users may reject the new technologies for several factors, that is, absence of user involvement, lack of an understanding, technical difficulties, lack of training, insufficient support from top management and perceived complexity. These are considered as the main causes of user resistance according to the research. Moreover, users may reject some technologies because these are not compatible with the values, beliefs and past experiences of their social systems.

A key issue in technology adoption and diffusion is user attitude according to Abukhzam and Lee (2010:60). Based on this, it is of critical importance to understand the factors that motivate or hinder user's attitude/s towards the adoption of technological systems because a favourable attitude is a key requirement for the successful application of such innovation.

User's Attitude towards Technology Adoption

Abukhzam and Lee (2010:62) indicate in their article that attitude can be a very powerful enabler or a barrier towards the adoption of the new technology. They concur with Ajzen (1988) as cited by Abukhzam and Lee (2010:62) in defining "attitude" as a complex conundrum of feelings, desires and fears that create a state of readiness to act within a person.

Prior technology adoption and diffusion literature (Rogers, 1983; Davis et al., 1989; Ajzen and Fishbein, 1980; Moore and Benbasat, 1991 and Tan and Teo, 2000) as cited by Abukhzam and Lee (2010: 62) indicates that user attitude is the key determinant of technology adoption. Factors such as innovation characteristics (for example perceived usefulness and ease of use, compatibility, reliability and security), organisational and managerial characteristics (for example leadership characteristics, fear of loss of autonomy and fear of security breach), and facilitating conditions (for example availability of government support and availability of top management support) have been found as the key influential factors affecting users' attitude towards adopting the proposed technological systems.

To get a sense of how users' attitude and reaction towards accepting and adopting new technologies, several authors (Rogers, 1983; Davis, 1986; Ajzen and Fishbein, 1975 and Tan and Teo, 2000) as indicated in the work of Abukhzam and Lee (2010: 62), have developed a core set of theoretical frameworks, which when used as a mediator to explain and predict the key factors (for example relative advantages of new technology, perceived compatibility and perceived complexity) influencing the technology adoption process. According to these studies, technology adoption is viewed as a consequence of a set of perceptions (attitude) towards the technology.

Ajzen's theory of planned behaviour postulates that having a more positive attitude towards a behaviour, leads to a greater intention to carry out that behaviour. The attitude in this context is based on the consumers' direct experience of using the VC technology with ease (Fazio and Mark, 1981: 189). The attitudinal beliefs were perceived usefulness, perceived ease of use and consumers' attitude on their intention to continue usage of VC technology.

Based on the theory of reasoned action Fishbein and Ajzen (1975) and Davis (1989) cited in Abukhzam and Lee (2010: 63)propose a technology acceptance model (TAM). TAM suggests that when a new technology is introduced to potential users, beliefs about its usefulness and ease of use are the essential elements in determining consumers' attitude toward using the technology. Consumer attitude in turn affects their purchase intention. Studies (Abukhzam and Lee, 2010: 63) of information technology products such as computers and software systems have found empirical support for the TAM. Other researchers recognised the need to adapt the model to different contexts and added new constructs. For example, enjoyment or fun has been found to have a significant effect on consumers' attitude toward new information technologies such as internet shopping and handheld communication devices (Bruner and Kumar, 2005) Ryan and Goss first indicated the identification of adoption as a process in 1943 (Rogers 1962: 79). Rogers categorises the 5 stages as knowledge, persuasion, decision, implementation and innovation/implementation. An individual might reject an innovation at any time during this adoption process.

Technology Adoption Models
Innovation Model

The 5 stage innovation model is explained in Table 1, which suggests that innovation diffusions commences at initiation and finished with diffusion/implementation.

Table 1: Rogers' Five-Stage Innovative Processes Model (1995)

1	2	3	4	5
Agenda Setting	Matching	Redefining/ Restructuring	Clarifying	Routinising
General problems in the organisation create the need for innovation	Fitting problem with an innovation	Modifying innovation to fit organisation and altering organisational structure	Defining relationship between organisation and innovation	Innovation subsumed into organisation's activities
Initiation stages		Implementation stages		

Source: Elliot and Loebbecke (2000:46)

Technology Acceptance Model

In the article by Abukhzam and Lee (2010: 63), titled "Workforce Attitude on Technology Adoption and Diffusion", indicate that one of the most utilised models in studying information technology adoption and diffusion is the Technology Acceptance Model (TAM). The goal of TAM is to provide a platform to trace the impact of external factors on user's attitudes and intention to accept new technologies.

These two main factors that influence user attitudes according to the TAM, suggests that when users are presented with a new technology adoption, their attitudes to use technology are influenced by perceived usefulness and perceived ease of use (PEOU) of the new technology. Abukhzam and Lee (2010: 63) suggests that perceived use (PU) as defined by Davis (1989: 320), is the degree to which individuals believe that using a particular system would enhance their job performance", whereas PEOU refers to "the degree to which individuals believe that using a particular system would require no effort". According to the theory, PEOU and PU have the capability to determine the actual use (usage behaviour) of the new technology.

Innovation and Diffusion of Technology

According to Hall and Khan (2003: 3), diffusion can be seen as the cumulative or aggregate result of a series of individual calculations. Abukhzam and Lee (2010: 67) indicate that one of the most widely recognised technology adoption frameworks presently is the Innovation Diffusion Theory, developed by Rogers in 1962, and has since been used to explain the process of innovation diffusion and adoption. Rogers' theory suggests that many factors such as the characteristics of an innovation, individual categories and communication channels can determine the adoption and diffusion of new technologies. As part of the research, consumers' relationships to the adoption process were also examined. These factors were found to be additional elements that indirectly affect a consumer's adoption decision. These elements are consumers' personal innovative traits and perceptions of the innovation's characteristics (namely: relative advantage, compatibility, complexity, triability, communicability and perceived risk as cited by Kotler and Keller, 2012: 612).

Individuals differ in readiness to try out new innovations. Theories of the innovation-decision and diffusion process hypothesize several categories of innovation adopters differentiated by the time of intended adoption or by their decision not to adopt. These are classified into categories of adoption, namely: innovators, early adopters, late majority and laggards.(Gatignon and Robertson, 1985: 854)

Benefits of Videoconferencing

The drive toward cost efficiencies and cost reduction in businesses today (including government institutions) provides a platform for the demand of VC technologies and services that have the following benefits: reduced travel, travel related costs, increased productivity across dispersed workforces and teams, improved hiring and retention of top talent, sustained competitive advantage, support for environmental initiatives, faster decision making and convenience, standardising work processes and keeping staff up-to-date frequently-changing policies, keeping the product development teams and client needs in synch,increased knowledge transfer and training, physical convenience, direct and indirect cost savings, physical convenience(Peoplelink Corporate Solution, 2011:1 and Stahl, 2009: 70-72).

The critical success factors that drive adoption and success in business to business VC systems are not just cost according to a supplier of VC technology.

• The other success factors are ease of use, secure accessibility (for desktops and rooms), HD quality video, integrated collaboration tools and low financial risk (Nefis, 2013:3).

• Research by Hammers (2009:53) indicate that the major benefits of VC were communication transparency, favourable timeliness for decision making, speed of information transfer, gaining time not travelled, reduced costs of employee travel, more ad hoc meetings between internal departments, specific communication between expected user groups, frequent communication between internal departments, shorter meetings, better preparedness and more efficiency (avoiding chit chat) and reduced CO_2 emissions.

Disadvantages and Challenges of Videoconferencing

Stahl (2009:72) states that the disadvantages or challenges, according to Bolanle's research pointed to two broad categories, namely: Ease of Use and the Human Side

Ease of Use

The disadvantages of VC from Ease of Use include the following:Set up and understanding how the technology works; the VC equipment was very intrusive and more units were required to allow more use of the facility within the organisation; user or participants in VC meetings become passive towards its use as IT drives the process of

utilisation;bandwidth is another factor that influences ease of use - that is latencies in transmission during VC; employees using VC in an organisation want to have direct access to VC however, IT is concerned with cost.

The Human Side

The disadvantages of VC from a human side include structure of the meeting and the nature of the interaction taking place in VC. Stahl (2009:72), referred to attendees of VC's preferring that the camera of the unit not be focussed on them as individuals. The research also indicated that people tend to lurk around VC venues. VC replacing travel was another perceived fear the intermediate employees had as they believed that VC needed to be complementary to travel and not be a replacement. Previous research deduced that if this fear was addressed, it could help alleviate resistance on perceived punitive potential of technology.

Other Disadvantages and Challenges

Research by Hamers (2009:53) accentuates that since users hesitate to use VC because they are not aware of the added value VC has to offer them in terms of achieving time efficiency, they were not convinced to use VC. This research also found that VC etiquette during the introduction phases of implementation, should be developed to include education for personnel on how to use the system and how to communicate with each other, create awareness as users need to get familiar with how to operate VC and the start-up protocols, explaining which meetings are suitable for VC, booking the conference room, selecting and inviting participants.

Research Methodology

In order to meet the research objectives, an exploratory approach was selected, as it enabled the identification of the factors that justified the assessment of adoption and diffusion patterns of VC technologies within the Company X. Specific data for this study was collected using case study methodology. It was a single case study design incorporating direct observation, survey questionnaire, interviews, descriptive analysis and the use of past records of financial information. The target population constituted 720 staff members at Company X. A probability sampling design, employing the stratified random sampling approach was used. The target population (720) was divided into the subgroups based on geographical location and job titles to determine the sample size of 180 respondents.Indepth interviewswere conducted with, three middle to senior managers, within Company X. Two questionnaires were constructed, namely the survey questionnaire and an interview schedule. The questionnaire was piloted among eleven respondents from the Cape Town office of the Company X. Feedback from the respondents were effected on the questionnaire. Telephonic interviews were conducted with middle managers while the survey questionnaires were self-administered via email and some administered by the researcher. One hundred and sixty two responses were received, which was a response rate of 90.%.The interviews were conducted telephonically and ranged from 15 to 30 minutes. The observations were conducted at the Western Cape Regional Office where the researcher was engaged in VC sessions of at least two hours each over a period of three weeks. The researcher used a combination of participant-as-observer and complete observer approaches to collect the data. This was recorded in a note book that was used to record other activities at the Western Cape Regional Office of the Company X offices. The secondary form of data that was used in this research was financial information and the capital expenditure costs that Company Xhad incurred when VC technology was implemented. This analysis was intended to demonstrate if the return on investment had been achieved within the company, which is for a reduction in travel and related expenditure. The analysis of the data was conducted using the Statistical Package for the Social Sciences SPSS, 17.0 (SPSS) and Microsoft Excel 2007. For the research findings to be credible, data triangulation was employed, namely: in-depth interviews, observation and secondary data. The Cronbach alpha test was conducted which indicated a good level of reliability ($\alpha=0.8578$, n = 29 for Section B and$\alpha=0.9233$, n = 12 for Section c).

Results of the Study

Company Xstaff awareness ofCompany X offering a VC facility

Ninety three percent of the respondents were aware of the company offering VC facilities. Therefore, the conclusion is that the rollout and awareness of the VC technology was well communicated within Company X. This further allows for the conclusion that perhaps the adoption and diffusion patterns would be higher since more respondents were aware of the facility.

Adoption and diffusion patterns of VC within the Company X

Fifty eight percent of respondents indicated that they used the VC facility whilst 42.2% indicated non use of the facility. The results suggest that although 93% of the sample population are aware of the VC technology, only half the population have actually adopted the technology due to:

- Their work not requiring the use of VC technology;
- Lack of awareness of the VC facility;
- Limited or no access to the unit;
- No perceived benefits seen;
- VC perceived as not being secure or safe;
- VC not allowing for personal interaction;
- Preference for current modes of collaboration (for example FTF meetings); and
- Not being rewarded to use the facility.

Users of the Technology: Frequency of Use of VC Technology

From the 57% of adopters of the VC technology, 52.7% use VC no more than once a week, implying that it is still not a common mechanism to communicate. Although the use of VC is a newly implemented technology, the once a week usage is encouraging for increased adoption.

Duration of use of VC Technology

Twenty three point seven percent of user's used VC mostly less than 1 hour each week whilst 30.1% of users used VC between 1 and 5 hours each week. The largest proportion of respondents did not indicate their usage patterns for frequency or duration.

Use of VC Technology

VC is used mainly for meetings (43.0%), followed by ad hoc communications (25.8%). The lowest use of the VC facilities is training followed by workshops and collaboration respectively. This suggests that VC represents a valid communication alternative to many meetings (for example scheduled/management meeting, consulting, reports or project presentations). Therefore the implications are that VC can be potentially an accepted fully integrated, diffused and adopted technology within the Company X.

Users Reasons for Adoption of VC Technology

Users indicated that they have adopted the VC technology for the following reasons (based on 3 broad categories):

Ease of Use
○ Seventy three point six percent of users indicated that VC was found to be an efficient method of interaction;
○ Learning to use VC was easy for 73.6% of users whilst 64.2% said VC is easy to use;
○ Sixty six percent of users responded that using VC enhances achievement of what needs to be delivered; and
○ Fifty nine percent of users find it easy to become skilful at using VC.

Benefits of VC
○ The statement on the use of VC's capacity to enhance quality family time (reduced travel) was strongly agreed to by 84.9% users;
○ VC is economically and environmentally better than air travel was strongly agreed to by 81.1% of users;
○ VC has made it easier to collaborate with colleagues was strongly agreed to by 79.2% of respondents;
○ Seventy seven point four percent of users strongly agreed that VC assisted in improving personal time management;
○ Interaction via VC had been beneficial was strongly agreed to by 81.1% of respondents;
○ VC enabled completion of collaboration tasks more speedily, was supported by 71.7% of respondents; and
○ The use of VC was believed to be safe and secure by 58.55% of respondents.

Implementation
○ With regard to the implementation being a quick and an efficient process, 40% of the respondents were neutral on the statement, while 27.3% agreed and 14.6% strongly agreed.

A weighted mean 'frequency-of-use' score was computed in order to reflect the frequency with which the VC technology has been adopted. The 'frequency-of-use' index or score showed that users have adopted and diffused the VC technologies as it enhances quality family time (4.24), is economically and environmentally better than air travel (4.17), makes it easier to collaborate with colleagues (4.06), whilst the remaining patterns of adoption and diffusion were also relatively popular with means above 3.00.

Non Users perceived expectations from the adoption/use of VC Technology
Non-users expectation of VC technology (if they started to utilise VC) is as follows:

Ease of Use
○ VC is expected to be easy for non-users to learn and to use was strongly agreed to by 61.1% and 58.3% of the respondents, respectively;
○ VC is expected to be an efficient method of interacting was agreed to by 50% of non-users;
○ Non users expect VC to be secure was the expectation of 55.6%;
○ The expectation of VC being easy to achieve what non-users want VC to deliver was strongly agreed to by 52.8% of respondents;
○ Non users expect to become skilful at using VC technology was an expectation of 52.8%; and
○ The ease of access to the VC facility was an expectation that was strongly agreed to by 58.3% of respondents.

Non users expectation of the Benefits of VC
○ Forty seven point two percent of non-users strongly agreed that they expected their interaction via VC to be beneficial to them;
○ VC was expected to improve non users personal time management was agreed to by 41.7% of respondents;

○ The expectation that VC would save non users time was strongly agreed to by 58.3%;
○ The second highest expectation that non users had of VC services offered was for VC to be of good quality (which includes sound, voice and picture) at 72.2%;
○ Fifty percent of non-users expect that by using videoconferencing they would be able to complete collaboration tasks more quickly;
○ VC is expected to be safe and secure was the expectation of 61.1% of non-users;
○ The highest expected benefit at 75% from non-users was that using VC would be economically and environmentally better than air travel;
○ VC enhancing quality family time (reduced travel) was expressed by 55.56%; and
○ VC making it easier to collaborate with my colleagues was expressed by 50% of the respondents.

These expectations show the inclination of non-users to become users and indicate to Company X what factors to consider in when trying to increase the adoption and diffusion of the VC technology.

What do you think the Company could do to Encourage Non Users to use VC?
The following summation included all responses regarding the question:
○ Reduce travelling budgets, for example management should not authorise travel plans for meetings and other interactions that could be achieved by using the VC facilities.
○ Management and staff should demonstrate via workshops how they are planning to use VC as a way of managing their resources in their respective units and regions.
○ Implement an effective communication strategy (for example, daily communication in portals and e-mails) throughout the company in order to promote the facility's availability and benefits to the work environment.
○ Frequent training and orientation of staff (workshops) regarding the use of the facility and the effectiveness of the technology.
○ Frequent use of the facility will assist staff in becoming familiar (how to adequately use the facility) with the facility and will allow all staff to interact.
○ Provide a guideline (quick user guide on portal/pasted in VC boardrooms) that provide outlined steps to accessing the system.
○ Communicate the benefits and advantages of the facility.
○ Users indicated they believed that Company X should enforced the use of the facility, for example by making the use of the facility part of company policy; making the use of VC a standing vehicle for business meetings, conferences and workshops; creating incentives for employees to use the facility (reward system) or mobilising and encouraging staff to use the facility.
○ Make the VC facility user friendly without connectivity failures or complications. In addition:
▪ Improve the picture (bigger clearer picture);
▪ Allow connectivity between all regions for both audio and visual;
▪ Minimise connection time to less than 10 minutes; and
▪ Improve sound clarity.
○ Allow non-users to become familiar with the technology by allowing interaction on a personal level with other colleagues in other regions.
○ De-stigmatise the facility as only being a high level communication system. In this regard create awareness that the facility is available to all staff.

○ Increase the number of VC facilities. For example install the VC facility in more boardrooms or in every boardroom.
○ Minimize teleconferencing.

Non Users Reasons for not Adopting/using VC Technology

● Non-users agreed that they did not adopt the use of VC as they did not believe it was beneficial to the company (40.5%). Thirty five point onepercent of non-users did not use VC for collaboration tasks as they preferred other modes of collaboration (for example face to face meetings).

● Thirty two point fourpercent of respondents indicated they generally did not adopt VC technology as their work did not require the use of VC.

● Non-users were neutral on the use of VC due to its importance to them at 40.5%. The use of VC in doing training/workshop activities was neutrally scored at 32.4% of non-users.

● Non-user were undecided if they would use these facilities if rewarded to do so by the company (27% were neutral and 27% agreed they would use the VC if rewarded to do so).

From the results above, it can be deduced that although the Company X communicated the availability of the technology, they may not have adequately explained the benefits of the use of the technology to staff.

Non Users Intended Adoption and use of VC Technology

Non-users intended adoption of VC as it allowed for personal interaction at 32.4%. Non-users would utilise VC as they believed it was secure and they could manage staff (meetings) at 29.7%. Forty sixpercent of non-user intended adopting VC as they believed it was safe and secure.

Return on Investment

In the second half of 2008, the Company Xinvestigated the possibility of implementing the VC solution in its quest to reduce operational costs. Subsequently, in October 2009 Company Xadjudicated a tender for the purchase, installation and implementation of a VC solution. The Company Xinvested R4 854 252 as the capital costs of VC with an extended maintenance cost of R365 630 for 1 year. (Company XBid documents).

The Financial Impact that the Technology Adoption had on the Travel Related Expenditure

The travel related costs of the Company Xas depicted in the Table 4.1 below shows substantial increase in travel related expenditure from the 2007/2008 financial year to the 2011/2012 financial year. The travel related expenditure in the table for years 1 to 5 is for a full financial year that is April to March.

Table 4.1: Travel related expenditure

Financial year	Rand value of actual travel expenditure	% increase/ decrease	Difference	Rand value difference
2007-2008	6 031 081.18			
2008-2009	23 202 578.24	384.7%	384.7%	17 171 497.06
2009-2010	24 348 634.77	104.9%	279.8%	1 146 056.53
2010-2011	23 116 637.76	94.9%	10.0%	-1 231 997.01
2011-2012	21 253 272.39	91.9%	3.0%	-1 863 365.37
Total	**38 510 420.11**			

There was a substantial increase of 384.7% in travel related expenditure from 2007/2008 to 2008/2009 amounting to an increase of R17 1717 497.06. Expenditure from 2008/2009 increased by 104.9% to R23 348 634.77 in 2009/2019. There was also a slight decrease in expenditure in the following two financial years of R1 231 997 and R1 863 365.37 respectively. Over the financial years analysed, there was a substantial increase in travel related expenditure. The expenditure trend of

the travel related item for the year that the VC technology was implemented was included in this analysis. However, it was unclear if the technology had assisted in reducing the travel related expenditure for the company. This is a limitation of the analysis, as there are subsequent financial years' information which could not be accessed for this study, hence, valid conclusions in terms of cost benefit and reduction in travel could not be deduced. The return on investment as indicated as a potential benefit in the literature review cannot be deduced confidently

What do you think the Company could do to get Current Users to use the VC Facility more Frequently?

The following summation included all responses regarding the question:

● Encourage the use of VC for all meetings, training, one-on-one sessions and interviews between regions; and discourage unnecessary travelling. More exposure to use the facility will enhance the skills and knowledge regarding this facility. Encourage this from national level (where most meetings are held) and filter it through the various regions.

● Make VC a compulsory requirement for all meetings.

● Reduce travelling budgets, for example management should not authorise travel plans for meetings and other interactions that could be achieved by using the VC facilities. In this regard the opportunity to reduce travelling costs by using the facility would be realised.

● Improve and monitor the quality and functionality of the system as more often than not the system is not functional or other participants are lost during the process. Improve the connectivity. Problems regarding quality and connectivity should not be dependent on IT personnel only and all staff should be able to address any problems regarding quality and connectivity.

● Monitoring the system to ensure that it is user friendly.

● Promote the benefits the facility has, for example:

○ Cost effectiveness of using the facility (show employees the cost implications of not using the facility);

○ Ease of use;

○ Time savings; and

○ Benefits of an improved VC facility (preventing previously experienced problems).

● Continuously communicate the availability of the VC facility (e-mail reminders, discussions).

● Frequent training and orientation of staff (workshops) regarding the use of the facility and the effectiveness of the technology.

● The use of the facility should be made available to all staff, at all levels and not exclusively to management.

● Improve the availability of the facility by installing more stations and areas.

● Create incentives or reward system to use the facility.

● Provide a guideline (quick user guide on the portal or pasted in VC boardrooms) that provide outlined steps to accessing the system.

● Limit telephone calls.

Could the Roll out of the Technology have been Improved?

The following summation included all responses regarding the above question:

● There should have been a comprehensive communication strategy regarding this technology

● The benefits of facility could have been communicated more effectively.

● Training sessions should have been provided, immediately after installation on how to setup the facility and how to use the facility.

● People who use the facility frequently can share insights with the rest of the organisation.

● Continually communicate and create awareness regarding the availability of the service to encourage frequent use of the facility.

● The facility could be upgraded in the following regards:
○ Improve quality of pictures;
○ Allow for greater volume of people to interact; and
○ Better bandwidth at Company X.

● Some problems were experienced regarding the specification of the VC facility. Incorrect equipment was installed and this presented a problem.

● Problems regarding quality and connectivity should not be dependent on IT personnel only and all staff should be able to address any problems regarding quality and connectivity.

● More thought and research should have been put into the needs of each unit.

● Enable a more general use of the VC facility.

● In the future employees could use VC via webcams, enabling employees access to the VC facility;

● Test the facility in phases:
○ Pilot the technology using non-critical meetings;
○ Start with straightforward one-to-one links;
○ Avoid multiple connections until users are familiar with the technology; and
○ Employ someone to manage the technology.

● Ensure that all regions are connected (some regional offices are experiencing connectivity problems). Each region should have a VC custodian who manages the connectivity, hardware for the system and the use of the facility.

● Decentralise IT personnel and ensure the placement of IT personnel in every region.

● Ensure that the facility is user-friendly.

Interviews and Observation

Interviews were conducted with the National Administration and Finance Manager, the Assistant Chief Financial Officer (ACFO) and the General Manager at Company X. The interviewees indicated that personnel at the higher levels within the Company Xare very happy with the implementation, support its full use and see the full adoption of the VC technology as an integral part of the Company Xbusiness and its existence. They viewed the technology as an enabler and adopted it at a much higher percentage of the sample population as the VC technology was used to drive most administrative and finance meetings, budget meetings, transformation meetings, project meetings and in some cases even used the facility for interviews. The interviewees did indicate a challenge with setting up and testing the system.

Observations were conducted at the Western Cape Regional Office (WCRO) and undertaken over a period of two weeks. These observations were completed at information sharing workshops with the Chief Financial Officer. The duration of these workshops were two to three hours and occurred over two sessions. Other observations were noted at change management meetings, inter unit meetings and finance collaborations. The observation highlighted that:

● Staff in the WCRO had challenges connecting the VC technology to the network even if tested prior to the meeting;

● There was no VC etiquette in terms of who should respond or when to talk as there was limited eye contact and in some instances no visual on the VC screen at all (audio was available);

● It was unclear whose responsibility it was to:
○ Test the system;
○ Who will dial into the bridge to use the unit; or
○ Who will turn off the unit.

● Punctuality upon initiation of the conference was poor and staff wandered in and out of the venue without necessarily making any input to the meeting or otherwise (a general disinterest in the meetings);

● There were challenges around sound (rather loud alarm) and noise in the background;

● The general agreement within the staff is that not all meetings should be via VC; at least one in every two or three meetings (depending on what meetings) should be face to face; and

● Technicians of VC also faced certain challenges. Due to the VC screens resembling Television screens (which appeared to have been left on by accident) the VC screen are often turned off, despite specific requests from technician not to do so. This challenge may seem small but creates immensetrials for the VC technicians as they lead to greater problems and frequent occurrences make the technician's jobs taxing. Users also occasionally cancel the VC scheduled without notification to the technicians.

Further observations found that whilst managers were exposed to the use of VC for meetings related to day to day activities, the rest of the staff were exposed to the use of the technology by and large for information dissemination purposes. Due to the VC unit being placed in the main boardroom of the office at the WC, KwaZulu-Natal and the Head Office (not sure about the placement of the unit at other offices), meetings in the boardroom can be scheduled only around availability of the unit and vice versa.

Conclusions from the Study

The study concluded that the use of VC technology is suitable but only certain types of the meetings are conducive to its use. Non-users indicated that they did not adopt the use of VC inter alia; they preferred other modes of collaboration for example face to face meetings. This finding is also in line with the literature review results. On the other hand, users perceived VC technology to be economical and environmentally better than air travel, which supports the environmental benefit of using VC technology as listed in the literature review.

Non-users indicated that they would only adopt and diffuse the technology if they perceived it would be easy to use, be an efficient method of interacting, was secure, to become skilful at using VC technology and have easy access to the VC facility. Users adopted the technology as they perceived it to improve personal time management, offered good quality sound, voice and picture.

The communications strategy of the Company Xdid not adequately address the benefits of the VC technology, its use, the requirements for use, the direction that the Company X was moving in, neither reasons for decisions to roll out nor the background. Training and orientation of staff regarding the use of the facility and the effectiveness of the VC technology were absent. There was no guideline (quick user-guide on the portal or pasted in VC boardrooms) that provided outlined steps to accessing the system. The use of the facility was not enforced by a company policy. Successful adoption and full implementation of any new technology is solely dependent on the workforce accepting and utilising the technology.

Users were frustrated at the technicalities of the set up and testing which was not understood nor adequately explained. There was no training regarding the set up and it seemed complex as observed as part of the primary research. This suggests that VC could potentially be an accepted fully integrated, diffused and adopted technology within the Company X.

The interviews conducted indicated that the higher levels of staff within the Company X were very happy with the implementation, support its full use and see the full adopting of the VC technology as an integral part of the Company X business and its existence. These members of staff viewed the technology as an enabler and adopted the technology, believing it to be physically convenient for certain types of meetings and that the cost saving it would attain was an added benefit to the Company X. The indirect benefit of increased productivity to more senior staff was appreciated by the interviewees. The interviewees also indicated that meetings were shorter and more efficient for faster decision making. These interviewees did indicate that there was a challenge with setting up and testing of the system.

Observations conducted suggested that the staff had challenges connecting the VC technology to the network even if tested prior to the meeting. There was also an absence of VC etiquette in terms of inter alia who should respond and when to talk as there was limited eye contact and in some instances no visual on the VC screen at all (audio was available). There was no clear responsibility as to who will test the system, who will dial into the bridge to use the unit or who will turn the unit off.

The study also indicated that there was no punctuality at the VC meetings and staff wandered in and out of the venue without necessarily making any input at the meeting or otherwise (a general disinterest in the meetings). There were challenges around sound (rather loud alarm) and noise in the background.

The general agreement within the staff is that not all meetings should be via VC; at least 1 in every 2 or 3 meetings (depending on what meetings) should be FTF. Further observations found that whilst managers were exposed to the use of VC for meetings related to day to day activities, the rest of the staff were exposed to the use of the technology generally for information dissemination purposes. Due to the VC unit being placed in the main boardroom at most regional offices, meetings via VC technology can only be scheduled around availability of the unit.

VC was used to conduct an interview of a candidate and the feedback received from the candidate was that the interview via VC worked well, and there was no challenge with the quality or the sound of the interview via VC. Observations prior to the interview yielded that the WC office was not advised of the interview prior to the candidates' arrival. At the last minute the staff at the WC office had to make arrangements with IT at Head Office to connect to the VC system. The interview was delayed due to the need to set up connectivity at short notice before the interview could be conducted.

Recommendations

Based on the analysis of data collected, the following recommendations are made.

Technology

VC needs to be made more user friendly without connectivity failures or complications, including enhancing the picture (bigger clearer picture), improving connectivity between all regions for both audio and visual, minimising connection time to less than 10 minutes, achieving sound clarity and permitting non-users to become familiar with the technology by allowing interaction on a personal level with other colleagues in other regions. The number of VC facilities should be increased. More exposure to the use of the facility will enhance the skills and knowledge regarding this facility. The Company X should enable a more general use of the VC facility. Perhaps, in the future the company could look into VC via webcams, as each employee has access to a camera facility on laptops or desktops. The system was not properly tested nor was it implemented in phases, that is pilot the technology using non-critical meetings, start with straightforward one-to-one links, avoid multiple connections until users are familiar with the technology and employ someone to manage the technology.

In view of the above challenges, it is further recommended that technicians should be employed to ensure that all regions are connected as some regional offices experienced connectivity problems. Each region should have a VC custodian who manages the connectivity, hardware for the system and the use of the facility. Also, IT personnel ought to be decentralised and represented in every region. The facility must be user-friendly.

Communication

There should be a comprehensive communication strategy regarding this technology and its benefits. The policy should be developed by the executive management team in conjunction with the IT team and be communicated to the staff of the Company X by the communications and strategy unit. The continual communication and awareness may be created regarding the availability of the service to encourage frequent use of the facility. A guideline (quick user guide on the portal or pasted in VC boardrooms) outlining the steps to accessing the system must be formulated and implemented. The use of the facility, VC etiquette and rules and regulations must be enforced by company policy.

Training

Regular training sessions must be provided, on how to setup and how to use the facility. Areas of weaknesses with the system must be identified and staff must be highlighted and addressed to ensure greater efficiency and adoption. Detailed training needs-analysis can be established for the training requirements of each unit and region. The training requirements should be determined by each user and the Regional Managers. The training requirements should be sent to HR to co-ordinate training with the IT department. HR and IT will need to budget for the training, set up training dates, times and venue. HR and IT will ensure there is a facilitator for the training (internal or external).

Other

The Company X should de-stigmatise the facility as being only a high level communication system and in this way create awareness that the facility is available to all staff. Staff preferred other modes of collaboration such as FTF meetings. This could be as a result of fear related to the change process (the fear of the unknown) or the reluctance to change and adapt to new, untested methods of communication and/or processes. It is therefore deduced that staff prefer FTF meetings as these are more personal. The Company X should therefore arrange training and change management strategies to encourage better adoption and diffusion.

From the results above, the study deduced that although the Company X communicated the availability of the technology, it may not have adequately explained the benefits of the use of the technology to staff.

Area for Further Study

The sample that was utilised to conduct this study was drawn from one parastatal, hence may render the results biased. It is therefore recommended that a similar study be conducted in the parastatals/entities, to ascertain if other organisations exhibit similar characteristics. This study can be used as the basis for further research.

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