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THE IMPACT OF EMPLOYEE EXPERIENCE IN UPTAKE OF COMPANY COLLABORATIVE TOOL

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Working behaviours are not easily changed, even though technology has been put into place to improve employee productivity and performance. Although construction projects are completed by multidisciplinary teams, human input is a common feature which provides lesson learning beyond the confinement of discipline specific procedures. This research focuses on an SME Civil and Structural engineering consultancy which is in the process of adopting Building Information Modelling (BIM) within the context of the UK government 2016 mandate. This research will explore how organisations can capitalise on user experience to maintain continuity amidst technological and social changes. A qualitative research strategy was adopted, based on an extensive literature review and semi-structured interviews in order to provide a snapshot of the actions undertaken by organisations to profit from employee experience. Reliance on an employee's ability and experiences can be a bar as it limits an individual's willingness to adopt different and new ways of working. As such, experience is a double edged sword as past ways of working can act as an inhibitor to the adoption of new practices.

Keywords: adoption of document management, BIM, employee experience.

INTRODUCTION

Organisations in the construction industry are continuously being pushed to adapt and adopt new practices and processes to move away from the traditional approaches which encapsulate operations in the industry. Historically the construction industry has had a negative reputation with adopting new methods or processes despite legislative and competitive incentives. Practitioners within the industry still resist to readily adopting these new practices. Adoption barriers within the industry focus on three aspects; process; products; and people (Lindblad 2013). This paper will address this issue through an exploratory study of the impact of employee experience on the adoption of new practices within an organisation. The paper is focused on a civil and structural engineering consultancy in the UK which implemented "*Workspace*", a document management software programme which is supplied by Union Square. *Workspace* enables organisations to capture, store and retrieve documents as well as drawings, images and emails. The programme is on a web-based server and can only be accessed through a secure log-in on the internally hosted portal, with appropriate permissions given to users. The product exists in a default state, but it can be modified to suit the specific needs of the relevant organisation. The consultancy implemented *Workspace* two years ago as part of the plan to adopt BIM across the whole organisation.

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Document management is argued to be a central aspect of BIM (Gu and London 2010), this paper will adopt a hermeneutic stance and will refer to the findings from the implementation of “*Workspace*” to highlight what may be expected with the implementation of BIM. The paper focuses on the human aspect, specifically the impact of employee experience. It is widely accepted that a person’s understanding of something is shaped by their practical and observational experiences (Clough 1973). This paper is centred on both of these views since the skills and expertise that one has in a particular field, plays a part in how they observe, learn and complete tasks.

PEOPLE AND ORGANISATIONAL CULTURE

Culture in the context of an organisation has been described as, the collectively bound actions of individuals which hold an organisation together (Cheung *et al.* 2011). Researchers have placed great emphasis on the impact of culture on the internal and external operations of an organisation, culture is important because it influences the attitudes and behaviours which filter into decision making. Furthermore, other researchers have suggested that competitive advantage and operational effectiveness can be sustained by culture (Zheng *et al.* 2010; Walker 2011).

Despite the fact that processes and products can be managed stringently, there is great difficulty in managing people because of the additional unseen and intangible factors which are always at work. Human behavioural and emotional issues must always be factored in where a tangible understanding of how a person will adapt to new technology is sought (Henderson and Ruikar 2010). These factors vary between individuals, and the context in which they are applied but they necessarily influence rationality and an individual’s ability to perform tasks. Adequate managerial support is required to facilitate the adoption of new practices by employees. There are competitive advantages when technology is adopted but the process is always more comfortable when everybody within the organisation is aware and prepared for the anticipated change. However, the majority of writing comes from the perspective of senior and top management individuals i.e. those who drive implementation, instead of from those who actually use the technology on a daily basis. The adoption process as it stands is very under-inclusive and a different approach that engages more employees at different levels of the organisation is required (Arayici *et al.* 2011). This paper explores this from a wider research perspective

PAVING THE WAY FOR THE ADOPTION OF BIM

BIM provides an advent for the construction industry to improve the whole lifecycle of a project through technology, project team organisation and management principles. Adoption of new practices is an ongoing problem in the construction industry as there appears to be little scope within existing organizational frameworks to facilitate the adoption (Howard and Björk 2008). The paper focused on current progress of BIM adoption in the construction industry and argued that there is a discrepancy between current industry procedures and standards to enable the adoption of BIM to be effective. Froese (2010) subsequently argued (in the context of IT adoption) that current practice is not well suited for collaborative or integrated working and this acts as an impediment to effective adoption. However, recent research argues that the very nature of current construction projects lend themselves to new knowledge and require employees to implement novel ways of working (Bygballe and Ingemansson 2014). Theories have been developed and adopted within the construction industry to facilitate successful adoption such as Technology Acceptance Model (TAM). However these claims appear to be unfounded, if the

industry was well suited for new ways of working, then surely there would not still be problems with adopting new practices.

Another argument placed emphasis on the actual complexity of the BIM solutions lending themselves for adoption to initially focus on limited areas (Howard and Björk 2008). A contrasting argument stated that there are more reasons against the implementation of BIM than there are for its implementation (Ashcraft 2008). Due to the apparent complexity of BIM solutions and the organisational changes required, individuals are further deterred from adopting new practices despite the evident benefits which could be achieved. This further shows the impact which an individual's experience can have on the adoption of new practices as a lack of understanding is a key hindrance to the adoption of new practices (Alshawi *et al.* 2010).

Technology Acceptance Model

Organisations have been advised to initially consider installing the technology with the lowest probable barrier to adoption (Davis and Songer 2008; Xiao and Noble 2014). This approach of implementing specifically selected components of technology to maximise the adoption success rate was argued in the context of the Technology Acceptance Model (TAM) theory Davies and Harty (2013a). TAM is widely accepted, used and tested in research to help understand and explain user behaviours in Information Systems (Venkatesh and Bala 2008; Legris *et al.* 2003) and technology (Straub *et al.* 1997; Straub 2009). TAM aims to resolve the ineffectiveness of attempts to adopt new technology that may be a result of individual experiences acting against these adoption attempts. The model focuses on an individual's belief on the perceived usefulness of technology to increase their job performance.

The application of TAM was most applicable for the project as it will provide an understanding of the individual beliefs that each employee has towards technology adoption and what lessons can be learned for the future. Additionally Davies and Harty (2013b) used TAM when focusing on the decision making and implementation of electronic document management, electronic data exchange and BIM. The authors focused on an individual's level of acceptance and parameters were established to measure individual beliefs for technology acceptance and use; these were as follows:

Performance expectancy: 'the degree to which an individual believes that using the system will help him or her to attain gains in job performance';

Effort expectancy: 'the degree of ease of use associated with the system';

Social influence: 'the degree to which an individual perceives that important others believe he or she should use the new system';

Facilitating conditions: 'the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system'; and

Attitude: toward using technology, an individual's overall affective reaction to using a system.

Furthermore the practicality of TAM theory in this research is grounded on establishing lessons learned from the adoption of *Workspace* to guide the adoption of BIM. TAM theory was used to conduct a comparative analysis of *Workspace* adoption. A key aspect of TAM requires employees to be aware of all the specifics (what will be changed and how it will be changed) of the intended change (Davis and

Songer 2008), also required for this research. Despite widespread acceptance that TAM theory can be utilised to facilitate adoption, one major critique is its lack of guidance to assist in its application (Lee *et al.* 2003), this is therefore an area to address.

Adopting new technology

Adopting new technology is a way for organizations to adapt to new situations (Alshawi, Lou and Goulding 2010), this has positive competitive benefits for the organisation within its operating market. The authors focused on organisational soft issues which influence the implementation of information systems and information technology in organisations. The main conclusion was that the construction industry still has to overcome barriers which inhibit the adoption of IT. However, the authors did not identify what the barriers which hinder the adoption of IT in the construction industry. Nonetheless, it provided an insight into the ripple effect that the adoption of new technology has. This related to changes to the organizational structure and culture.

Henderson and Ruikar (2010) conducted research on factors which influence successful adoption of technology by construction industry companies. One of their findings suggested that poor uptake of technology is a result of the disparity of experiences between large and small sized companies. This implies due to the significantly large quantity of “*small*” companies operating within the industry the success rate has been negatively skewed. This is well understood in terms of measurements such as the number of employees and annual turnover. The next section will discuss the research methods adopted in order to provide conclusions based on meaningful inferences. Data will be collected using semi-structured interviews for a more in depth discussion of the problems identified in the literature review.

RESEARCH METHODS

A qualitative research strategy was adopted for this project. The use of qualitative research enables data to be collected whereby respondents can convey and express their views. Quantitative research methods were deemed unsuitable because the research project isn't focused on statistical findings of the impact employee experience has on adoption practices within an organisation. The focus is on the exploration of the reasons why employee experience impacts adoption practices and what lessons can be learned to inform future adoption projects. Naoum (2012) stated qualitative research emphasises meanings, experiences and provides description. Bryman (1992) also stated that qualitative research enables opinions, views and perceptions to be gathered. This has been used in research to understand beliefs, opinions, views and perceptions regarding factors affecting the industry in the application of new technology (Howard and Björk 2008). Although quantitative data can provide meaning inferences, these are subject to the interpretation of the researcher which may be affected by bias in comparison to qualitative data which is based on intrinsic explanations of an individual.

Data collection

The literature review identified themes which affect or are affected by employee experiences in adopting new practices. The questions were developed to resolve gaps identified but also validate the findings in literature in relation to the research aim. The summarised responses were reviewed in conjunction with the findings in the literature. Semi-structured interviews were conducted, as the nature of this

interviewing technique enables the respondents to explore and discuss other themes that may not have been apparent in literature. The interview questions were categorised to build a detailed profile of each respondent (work history, experience, expertise) and also enable reflection of each section before proceeding to the next question. This form of data collection enabled the researcher to define who the respondents were; determine the required sample size in relation to the use and the relevancy of the results.

Population sample

The respondents for the interviews were employees of a civil and structural engineering consultancy based in the Derby (UK) head office, operating in the departments that undertake project work in the building environment (structural, civil engineering and environmental). The company has an annual turnover of £5million and a workforce of over sixty employees across three offices; fifty of the employees are based in Derby. The organisational chart for the organisation was reviewed and at least two respondents were selected randomly from each department to represent the different roles which ranged from technicians to project engineers and directors. All the respondents were required to have had at least six months experience within the organisation, so that they should have had practical experience in the *Workspace*.

FINDINGS

Workspace provides a central repository for storing all project data through a formal convention. Wider accessibility of information contained within emails was the main driving force in the organisation adopting the *Workspace* software. As with any software the success of *Workspace* is reliant on how individuals implement it, and based on actual findings from data collected so far it has been used inconsistently by individuals across all the different management levels and departments. The analysis of the findings will be based on the criteria established by Davies and Harty (2013b) as it considers an individual's level of acceptance.

Table 8: List of interviewees

Code	Job role	Department	Management level	Years in Company	Years in industry
A	Director	Environmental	Director	12	19
B	Project Engineer	Environmental	Middle	8months	8
C	Senior Technician	Structural	Senior	13	34
D	Senior Project Engineer	Structural	Senior	9	9
E	Divisional director	Civil	Director	14	14

Interviews were conducted with five respondents occupying the roles of; technician, project engineer and director in their respective department as shown in *Table 1*. Each interview lasted no longer than an hour, and the interview questions covered the themes of; culture, context, legislation, standards, and collaboration. The use of semi-structured interviews allowed the respondents to provide insight into other themes which affect the adoption of new technology such as training, operational performance and other such relevant issues.

Performance expectancy

The interviewees unanimously agreed that *Workspace* is a good tool for managing emails but not so good for the management of project specific data, i.e. saving

drawings in X-ref format has been a problem. *Workspace* isn't particularly useful as a working tool and is seen as archive storage (Respondent A). Although all employees understood that everything has to be stored on *Workspace*, not everyone is doing this. It has been highlighted that limited organisational support negatively affects BIM adoption (Xiao and Noble 2014). The responses that were provided indicate that the adoption of *Workspace* has not been supported by the whole organisation, as employees are failing to fully utilise *Workspace* fully because of their individual experience and lack of thorough understanding of *Workspace*'s facilities. It can be argued that a similarities situation can be expected to the possible adoption of BIM. This is because negative perceptions which limits the adoption of BIM can be attributed to a lack of understanding and awareness to the benefits and capabilities of BIM solutions (Gu and London 2010). Respondent E reinforced this by stating there is a general lack of awareness of the specific capabilities of *Workspace*. It is evident that if employees were made fully aware of the benefits and capabilities of *Workspace* this would facilitate its successful adoption. *Workspace* can be used to draw parallels of what is to be expected with the implementation of BIM because document management is an integral part of both systems (Davies and Harty 2013a; Gu and London 2010).

Effort expectancy

Workspace was expected to provide a central location to store all project data but it has not been particularly successful in changing old working habits as attitudes are much harder to change. Respondent A stated that *Workspace* requires discipline, which tends to vary between people, whilst respondent B stated that getting into the habit of using *Workspace* properly is the difficult part to grasp, this was from a Director and middle management perspective. Both arguments support that people's behavioural patterns are not easily changed. BIM adoption requires a change in mindset and work processes not just by single actors or individuals but as a collaborative effort (Lindblad 2013). *Workspace* was implemented for adoption across the whole organisational structure and requires all employees to implement it correctly. The weakness and failure of *Workspace* to support certain drawing formats such as X-ref has resulted in employees maintaining use of the "*P-drive*" on the IT network as experience has proven the success of that method (respondents C and D). This resistance to adopting *Workspace* is due to experience and could possibly occur with BIM, as there are some fundamental principles which employees could choose to ignore such as information management or collaboration because of their experience and their previous ability to complete work successfully.

Social influence

The success that result from innovative change, can only be fully realised if they are influenced and supported by constituent members of the organisation (Alshawi *et al.* 2010). A top-down approach was adopted for the implementation of *Workspace* with senior management spearheading and promoting its implementation throughout the organisation. It appears from the interviewees own subjective view, that they were not under pressure to conform with the use of *Workspace* when it could not support their requirements. Respondent D stated that personalities play a big part in the application of technology because some people are good, and others are bad at adopting new ways of working Measures that are put into place to facilitate the adoption of new practices however, are indiscriminate between individuals (Gu *et al.* 2007).

Facilitating conditions:

The measures that are taken prior to the instigation of change are just as important as those that are taken during and after the implementation (Xiao and Noble 2014). Respondent E (a director) acknowledged that more could be done to ensure that employees were provided with the appropriate training to enable the effective usage of *Workspace* and respondent A (a director) further argued that a degree of IT literacy is required in addition to the training provided. Respondent A additionally stated that strict and disciplined application of *Workspace* is an area that the organisation has to improve at a cultural, individual, team and business level. Furthermore, discussions which emphasize the need for technology on an organizational level (Alshawi *et al.* 2010) and redirection of technology adoption problems as an impersonal issue further fuel this need.

Attitude

The process for the adoption of technology has to be inclusive in order to avoid slow adoption and resistance (Arayici *et al.* 2011). Respondent D highlighted that resistance to the adoption of new technology should be expected “*because you spend over 10 years doing things one way and suddenly changing to another*”. This statement supports the necessity of the adoption process being incremental and focusing on limited areas (Howard and Björk 2008) to avoid sudden changes which can be very disruptive to working momentum. Past experience undermines adoption regardless of how effective a new practice or technology will be, and those lower down the organisational hierarchy are more likely to resist adoption than others (Henderson and Ruikar 2010). This was evident in the interview responses; the Directors (A and E) showed the least amount of resistance to adopting *Workspace* as compared to the other respondents. Respondent B expressed that using *Workspace* as is required would be a time consuming exercise, but concluded by saying that realistically, the time spent is no different to that on existing methods of storing data. This re-enforces the argument that perceptions with regards to the expected use of technology actually affect its use (Straub 2009).

CONCLUSIONS

The findings of this exploratory research have illustrated the impact employee experience has had on *Workspace*, and as such what may be expected when BIM is implemented. Based on the reception of *Workspace* within the organisation, it is vital for the implementation of BIM that negative attitudes towards its adoption be quelled and positive attitudes nurtured and encouraged in order to facilitate effective adoption. To overcome resistance, measures need to be employed in the form of; active participation, training, communication and education. In particular, it is fundamental that these measures are not only present during and after implementation, but also at the pre-initial stage any of any change.

One limitation of this work is that this paper comes from the perspective of a consultant and its employees. It does not consider the point of view of the project manager or the other project stakeholders i.e. the clients, system developers and others. Indeed the findings of the research will be beneficial to the organisation primarily but it would be invaluable to acquire data from other disciplines that have implemented document management on their journey to adopting BIM.

There are numerous benefits to using *Workspace* as a collaborative tool, but these cannot be realised unless it is used correctly and universally. Moving forward, it

would be useful to appoint a user champion within each department to encourage the adoption of *Workspace*, ahead of the BIM implementation. A similar BIM champion would make it possible for any issues that arise to be dealt with directly. Finally, making the review of *Workspace* usage an agenda item in the annual performance reviews, would emphasise the importance of feedback and the vital role it plays to improving the work environment.

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