2010

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Disciplines

Engineering | Science and Technology Studies

Organisational Culture and Organisational Impacts of Information Systems: A Review of the Empirical Literature

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Abstract

Organisational culture is an important influence in shaping the organisational impacts of Information Systems. However, the conceptualisation and operationalisation of culture in empirical studies does not reflect the richness of the theoretical literature. In particular, our review finds that the dynamic, emergent and reciprocal nature of the IS-culture relationship has not been adequately examined in the empirical literature. This is partly due to the methodologies employed in existing research. Suggestions for enriching empirical research into the IS-culture relationship are discussed.

Keywords

Organisational culture, information systems, IS impacts, structuration.

INTRODUCTION

Understanding how a given social collective will react towards a new technology is critical to the effective development, adoption, implementation and management of technology. As a result, culture is an important issue to investigate in Information Systems (IS) research. In recent years, IS researchers have increasingly employed the concept of culture to explain the organisational impacts of IS.

Our review of the empirical studies employing culture to explain the impacts of IS finds that culture is primarily treated as a static construct. However, the introduction of IS to an organisational context sets into motion a number of dynamics that re-shape the organisation, its culture, as well as the IS itself. We argue that a much richer understanding of the impacts of IS can be constructed by treating culture as embedded in and evolving with the dynamic social environment in response to the actions of various actors, including users, designers, and managers. We also argue that the research methods currently employed in empirical studies examining the mutual IS-culture relationship are unable to capture the dynamic, emergent and reciprocal characteristics of the phenomena. Further progress in understanding the IS-culture relationship will also depend on employing appropriate methods for the capture, analysis and interpretation of data.

This paper is structured as follows. The first section provides an overview of current literature employing the concept of organisational culture to understand the impacts of IS. A review and evaluation of the current empirical organisational culture literature is then presented to help synthesise existing understanding in the field, highlight research gaps and propose a new perspective in conducting IS-organisational culture research. We then review and analyse the different research methodologies employed in the empirical literature examining the IS-culture relationship. We conclude with suggestions for future research.

INFORMATION SYSTEMS AND CULTURE: AN OVERVIEW OF THE RESEARCH

Culture is a concept that lends meaning to our everyday behaviour. It unites us as a society and underlies our everyday thoughts and behaviours (Bate 1984; Cooper 1994; Hofstede 1998; Leidner and Kayworth 2006; Robey and Azevedo 1994). It shapes the way we perceive unfamiliar artefacts, confront challenges, solve problems and adapt to the new environment (Chandrasekaran 1983; Crookes and Thomas 1998; Schein 1996; Xie et al. 1998). Not surprisingly, organisational culture also shapes the impacts of IS on organisations.

An important issue for researchers is to understand the mechanisms through which IS and organisational culture reciprocally shape each other. We review below the mechanisms employed in the empirical literature to explain their findings discussing these reciprocal effects.

Effect of Culture on Shaping Impacts of IS

Our review of the empirical literature finds that it identifies three main mechanisms through which culture shapes the impacts of IS: the social interpretation of IS, social actor's response to uncertainty, and functional fit (see Table 1). Social interpretation of IS stresses the fact that IS is subject to social interpretation by its users. This can result in different meanings being assigned to the technology than the meanings that shaped the decisions and actions of the development team (Meyerson and Martin 1987; Sahay 1997; Griffith 1998; Gamble and Gibson 1999; Huang et al. 2003). In the studies examined, culture shapes the social interpretation processes of the organisational members (Robey and Azevedo 1994; Robey and Boudreau 1999), and as a result, significantly influences the social meaning being attributed to the technology. Depending on the existing culture, the same piece of technology can be interpreted in distinctly different ways in different organisations and even by different members within the same organisation (Robey and Boudreau 1999; Sahay 1997). For instance, the same technology can be viewed both as empowering or deskilling, as reducing or enlarging existing power distance and as restrictive or liberalising (Barley 1986; Nedovic-Budic 2000; Doherty and Doig 2003). Social member's interpretation of IS is found to be a critical influence on their willingness to accept, adopt and use IS (Cabrera et al. 2001; Gobbin 1998).

Table 1: Mechanisms identified in the literature through which culture shapes the impacts of IS

Mechanisms	Explanation	Example Studies
Social interpretation of IS	Culture shapes how social actors perceive IS, and consequently influences their willingness to adopt and use IS as well as IS's effectiveness	(Cabrera et al. 2001; Griffith 1998; Hasan and Ditsa 1999; Hill et al. 1998; Hussain 1998; Kaarst-Brown and Robey 1999; Loch et al. 2003; Madon 1992; Moghadam and Assar 2008; Montealegre 1997; Robey and Rodriguez-Diaz 1989; Ruppel and Harrington 2001; Sahay and Robey 1996; Sawy 1985; Shore and Venkatachalam 1996; Travica 2008; Vreede et al. 1999)
Response to uncertainty	Culture determines how social actors are likely to react when faced with change brought by IS implementation.	(Sawy 1985; Robey and Rodriguez-Diaz 1989; Cooper 1994; Watson, Ho and Raman 1994; Sahay and Robey 1996; Shore and Venkatachalam 1996; Montealegre 1997; Gobbin 1998; Hill et al. 1998; Hussain 1998; Hasan and Ditsa 1999; Kaarst-Brown and Robey 1999; Vreede et al. 1999; Hoffman and Klepper 2000; Cabrera et al. 2001; Harper and Utley 2001; Png, Tan and Wee 2001; Johns et al. 2003; Loch et al. 2003; Moghadam and Assar 2008; Travica 2008)
Functional Fitness	The effectiveness and appropriateness of IS functionalities vary across different organisations and cultures.	(Cooper 1994; Watson et al. 1994; Sahay and Robey 1996; Shore and Venkatachalam 1996; Gobbin 1998; Hill et al. 1998; Hussain 1998; Wheeler 1998; Hasan and Ditsa 1999; Vreede et al. 1999; Hoffman and Klepper 2000; Cabrera et al. 2001; Harper and Utley 2001; Png et al. 2001; Ruppel and Harrington 2001; Downing, Gallaugher and Albert H 2003; Huang et al. 2003; Loch et al. 2003; Moghadam and Assar 2008)

The second mechanism through which culture shapes the impacts of IS and the response of social members to the change in social practices brought about by the introduction of new IS is a social actor's response to uncertainty. Culture provides the rules and resources for shaping members' response, and hence plays an important role in shaping how they would respond to change and the ensuing uncertainty (Xie et al. 1998; Hasan and Ditsa 1999; Johns, Smith and Strand 2003). Cultures with high uncertainty tolerance characteristics such as being "open", "flexible" and "sociable" have been consistently found to be associated with more positive impacts of IS (Cooper 1994; Doherty and Perry 2001).

The third mechanism we identified in our review of the empirical literature is functional fitness. It refers to IS's ability to address the different user requirements and preferences within a specific culture. Functional misfit is a common occurrence in cross-cultural IS transfer projects, where the original IS's key functions are regarded to be inappropriate or redundant in another culture. Depending on different cultural characteristics, the same technology's effectiveness varies between social collectives.

Effect of IS on Culture

The introduction of an IS within a social environment also has the effect of shaping the culture. Our review of the empirical literature identifies two main avenues through which IS shapes the culture: by proactively changing the existing social action patterns, and through introducing new values into the social collective (see Table 2). IS's ability to influence culture is mainly embedded in its ability to change the operational practices and power balances within an institution, which are the key constituents of the social reality and culture (Doherty and Doig 2003; Orlikowski and Robey 1991). By confirming or disrupting the existing social action patterns within a collective, IS is directly implicated in the transformation or confirmation of social practices, which are the manifestations of culture (Orlikowski and Robey 1991). Furthermore, an empirical study by Walsham (2002) has also highlighted IS's ability to change existing culture through introducing new cultural values without being successfully accepted into the society. The novel cultural value introduced helps to condition existing culture, which in turn, facilitates successful IS readoption in the future. Similar ideas and findings have also been documented in Barley (1986), Madon (1992) and Robey and Azevedo (1994).

Table 2: Mechanisms identified in the literature through which IS shapes culture

Mechanism	Explanation	Studies
Change social practices	IT can change culture by disrupting the existing patterns of social action.	(Barley 1986; Coombs et al. 1992; Doherty and Doig 2003; Doherty and Perry 2001; Madon 1992; Robey and Azevedo 1994; Sahay and Robey 1996; Walsham 2002)
Introduce new values	IT changes culture through introducing new values into the social collective	(Barley 1986; Madon 1992; Robey and Azevedo 1994; Walsham 2002)

IS-Organisational Cultural Research Streams

In general, two main streams of enquiry can be identified in the IS-organisational culture studies (see Table 3). The first research stream focuses on the investigation of the relationship between organisational culture and the adoption, implementation and acceptance of IS. The second stream of investigation uses organisational culture as a medium to study the consequences of IS on organisations. Tables 4 and 5 provide brief summaries of the papers in these two streams

Table 3: Two main research streams at the organisational level

Research Streams	Explanation	Studies Reviewed
Culture and IS adoption, implementation and use	Studies focus on the examination of organisation culture's impact on the adoption, implementation, diffusion and acceptance of IS	(Cooper 1994; Harper and Utley 2001; Hoffman and Klepper 2000; Huang et al. 2003; Meier 1999; Travica 2008)
Culture and IS implementation consequences	Studies focus on understanding IS's impact on culture and its unpredictability	(Barley 1986; Coombs et al. 1992; Doherty and Doig 2003; Doherty and Perry 2001; Madon 1992; Sahay and Robey 1996)

The first research stream generally treats organisational culture as an invariant factor influencing the process of IS adoption, implementation and use. As a result, studies in this stream rely on mechanisms identified in Table 1 to explain their findings. As shown in Table 4, all three mechanisms identified in Table 1 have been employed in the studies reviewed. The impact of organisational culture on the adoption, implementation and use of IS is commonly studied through its impact on values (Cooper 1994; Harper and Utley 2001; Hoffman and Klepper 2000), the effect of subculture differences (Huang et al. 2003; Meier 1999; Travica 2008) and structuralist analysis (Sahay and Robey 1996).

Studies examining the influence of values find that similar cultural values can produce very different organisational consequences (Harper and Utley 2001; Hoffman and Klepper 2000). This highlights the need for in situ process related investigations to improve the current understanding of the effects of culture (Brannen and Salk 2000; Myers and Tan 2002; Straub, Loch, Evaristo, Karahanna and Srite 2002; Huang et al. 2003).

From a different research angle, several studies have sought to explain the difficulties in the assimilation of IS as a result of sub-cultural differences within an organisation (Meier 1999; Huang et al. 2003; Travica 2008). These studies find that sub-cultural differences are detrimental to successful IS implementation. These studies highlighted the existence of subcultures within an organisation and presented a new way of looking at organisational culture.

The second stream of research focusing on the relationship between culture and the consequences of IS implementation has attracted the attention of both IS researchers and organisational investigators. Studies have been conducted to facilitate better understanding of IS's impact on organisational culture as well as the unpredictability of the consequences of IS.

Some notable conceptual and empirical groundwork has been laid in this stream of research. Existing studies have demonstrated IS's capability in influencing the values underpinning organisational cultures (Doherty and Doig 2003; Walsham and Sahay 1999) and highlighted the existence of unanticipated cultural change (Barley 1986; Doherty and Perry 2001). Furthermore, a few studies have adopted a more sophisticated perspective and reject the treatment of IS as an independent variable for predicting organisational cultural change (Robey and Azevedo 1994). These studies recommend a proccessual view of cultural change to effectively account for IS's ability to both sustain and alter the existing cultural values within the organisation (Barley 1986; Madon 1992; Sahay and Robey 1996).

Table 4: Summary of Organisational Culture and IT Adoption/Implementation Studies

Author	Research Method	Control Mechanisms	Nature of IT/Culture Influence Assumed	Culture Conceptualisation Used
Huang, Newell et al. 2003	Single case study: on-site observation, Interviews, informal dialogue and documentation.	Functional Fitness	Static	Cultural Typologies
Cooper, 1994	Survey of MIS academics	Functional Fitness & Uncertainty Behaviour	Static	Cultural Typologies
Hoffman and Klepper , 2000	Multiple Case studies : Observation	Functional Fitness & Uncertainty Behaviour	Static	Value Dimension
Harper and Utley, 2001	Survey	Functional Fitness & Uncertainty Behaviour	Static	Value Dimension
Travica, 2008	Interpretive Case study: interviews	Social Interpretation of IT	Static	Value Dimension
Meier 1999	Comparative case studies: interviews	Social Interpretation of IT	Static	Value Dimension

DIRECTIONS FOR FUTURE IS-ORGANISATIONAL CULTURE RESEARCH

One key observation obtained from the above literature review is that the large majority of these existing empirical studies employed only one set of mechanism or change trigger to explain the findings of their study. This suggests an implicit assumption of a static, unidirectional relationship between culture and IS. However, as most theorists and empirical researchers propose, both IS and culture are part of a social system (Bate 1984; Cabrera et al. 2001; Orlikowski and Robey 1991; Watson et al. 1994), constantly influencing and being influenced by each other. A reciprocal relationship between the two constructs is articulated in the theoretical literature (Gamble and Gibson 1999; Robey and Boudreau 1999). Their reciprocal interaction is regarded as a dynamic process, constantly changing with user adaptations and external influences (Orlikowski and Robey 1991; Cooper 1994; Loch et al. 2003). As a result, any changes in cultural values have been characterised as gradually emergent (Orlikowski and Robey 1991; Robey and Azevedo 1994; Robey and Boudreau 1999; Huang et al. 2003).

Analysing a dynamically evolving phenomenon through a static theoretical lens can lead to the capture of a partial and, incomplete picture of the phenomenon. Such research approaches are inadequate in addressing the characteristics of organisational culture. This is a significant research gap within the current literature. So far, few

studies have accounted for the dynamic and emergent nature of the IS-culture relationship within their design and even fewer have investigated the reciprocal interaction between the two constructs. We believe that in order to start building a systematic understanding of the IS-culture relationship, studies need to be designed to address the reciprocal, dynamic and emergent nature of IS-culture interaction within the organisation. Towards this end, the following section provides a review and evaluation of the methodologies employed in IS-culture research to help the design and conduct of future organisational culture studies.

Table 5: Summary of Organisational culture and IT consequences studies

Author/Year	Research Method	Triggers/Control Mechanism	Nature of IT/Culture Influence Assumed	Culture Conceptualisation Used
Coombs, Knights et al, 1992.	Case study illustrations	Change social practices	Dynamic & Emergent	Interpretive/ Grounded
Barley, 1986	Comparative case Study: Longitudinal, observation	Change social practices & Introduce new values	Reciprocal & Emergent	Structural Analysis
Doherty, N. F. and G. Doig , 2003	Multiple case study: Interviews	Change social practices	Emergent	Cultural Typologies
Doherty, N. F. and I. Perry, 2001	Exploratory study: Survey + Interviews	Change social practices	Emergent	Value Dimension
Madon, 1992	Longitudinal case study: interview + observation	Introduce new values	Reciprocal & Emergent	Interpretive/ Grounded:
Sahay, S. and D. Robey, 1996	Inductive, comparative case study. In-depth interviews	Social Interpretation of IT , Uncertainty Behaviour & Change social practices	Reciprocal & Emergent	Structural Analysis

Measuring Culture: Issues in Collecting and Interpreting Data

One of the most significant challenges in IS-culture studies is to measure culture. This is especially difficult due to the abstract and situated nature of culture. The measurement of culture in empirical studies involves both data collection and data interpretation. These are guided by the investigators' assumptions regarding culture. In this paper, we evaluate the different data collection and interpretation methods used based on their ability to address the dynamic, reciprocal and emergent nature of the IS-organisational culture interaction.

According to the widely accepted model of organisational culture proposed by Schein (1992), culture can be represented at three different levels. The core level is composed of basic underlying assumptions and beliefs; the middle level is composed of espoused values; and the outer level is composed of artefacts, which constitute the external manifestations of culture (Cooper 1994; Doherty and Perry 2001; Leidner and Kayworth 2006). The underlying assumptions usually operate within people's subconscious and are usually inaccessible for direct measurement. Consequently, empirical studies measure culture at the espoused level and/or artefact level.

Commonly employed methods vary in their ability to measure culture through espoused values and/or examination of artefacts. Surveys and interviews are most commonly employed to directly collect data about the espoused values held by the research targets, while observations examine culture from the artefacts level. Each research method has its own strengths and weaknesses (see Table 6). Depending on the settings and focus of the study, their effectiveness varies. The survey's ability to accurately and reliably assessing respondents cultural values have always been widely debated among researchers. Few researchers trust the respondents' ability to accurately and honestly reveal their true values and beliefs (Kwan and Walker 2004). The self-reported nature and usually inflexible measurement structure of surveys can significantly restrict the reliability and robustness with which culture can be captured, or measured.

The majority of existing studies adopt interviews, especially semi-structure interviews, These have been regarded as a more flexible medium to measure culture given its ability to capture unexpected results and enable the collection of more realistic data through interactions with the respondents (Hill et al. 1998; Sackmann 1992). However, due to the resources requirements in conducting interviews, interview sample sizes are usually much smaller than that of the survey, and consequently raise the challenge of selecting limited but appropriate respondents to reliably reflect the culture under investigation.

Finally, observation is the most resource intensive method of data collection, but also the one providing the richest data for analysis. By observing the behaviours of the research participants, a comparative more accurate picture can be obtained about the behavioural manifestation of the underlying culture, which in term provides a richer set of data for researchers to interpret and decipher (Robey and Azevedo 1994; Schein 1996). Its main weaknesses lie in its resource intensive nature which requires very careful justification of research perspective and target selection, and its focus on the artefact level of culture, which is the most difficult to decipher (Schein 1985).

Table 6: Evaluation of key methodologies in IS-culture research

Instrument	Weaknesses	Strengths	Evaluation
Survey	Self-reported, lack reliability. Hard to justify validity and comprehensiveness.	Easier to obtain a sizable population to enable generalised measurement of culture. Relatively cheaper to conduct.	Not appropriate for investigating organisational culture as there is no established survey instruments and the self-reported data reliability is questionable.
Interviews	Expensive to conduct, reaches a small population.	More flexible and accurate reflection of cultural values. Have the potential to generate more insights than Survey.	Can be advantageous for organisational culture studies to directly measure the values and beliefs of the respondents. But need to carefully select respondents to obtain an accurate reflection of culture.
Observation	Extremely expensive and time consuming to conduct. Data collected hard to interpret.	Most objective way of collecting reliable data. Most flexible for gathering insights about an unknown phenomenon.	Beneficial to increase the reliability and validity of the research design. But need to ensure the observation target is properly selected and interpretation schemes are well justified.

Given our focus on examining organisational culture's dynamic, reciprocal interaction with IS, survey is regarded as inappropriate due to the lack of mature survey instruments in the field and its inherent questionable data reliability. The interview and observation method however shows potential for assisting the investigation. By combining these two research methods, it is hoped that these two methods can complement each other in the way that the observation will provide objective benchmarks for the interpretation of interview data, while interviews will help decipher the observation data gathered by revealing deeper level values and beliefs of the research targets.

Data Interpretation

Interpreting and deciphering the data gathered to reveal the deep-seated cultural assumption is the most important and challenging aspect of this stream of research. As a result, selecting the most appropriate cultural conceptualisation tool is crucial. So far, four main types of cultural conceptualisation have been commonly adopted in the existing studies. The most popular conceptualisation type interprets culture in terms of value dimensions, typified by Hofstede's work on national culture dimensions. According to the behaviour characteristics and intentions of different social group members, different cultures are assigned a number of value dimensions. A set of these dimensions would collectively represent a culture, and each culture dimension helps to

predict a certain aspect of behaviours by relevant social actors. Due to its relative ease and simplicity in operationalisation, the value dimension categorisation has been widely adopted in cultural studies to examine and explain the social behaviours and cultural impacts.

The second type of conceptualisation interprets culture with a typological framework such as the competing values model (Kwan and Walker 2004; Lamond 2003). By evaluating culture based on criteria such as openness, flexibility or internal/external focus, different cultures are classified into different typologies. Given the scores obtained on each evaluation criteria, cultures can be regarded as a different combination of a number of cultural typologies on a typological framework. There is currently no agreed upon evaluation criteria based on which an accurate and comprehensive description of culture can be obtained. Due to the fact that this type of conceptualisation commonly restricts cultural typological mapping on a two-dimensional grid, its explanatory power is limited.

Table 7: Conceptualisation schemes for evaluating culture

Conceptualisation	Explanation	Evaluation
Value Dimension e.g. Hofstede's national culture taxonomy:	Develops a set of cultural value dimensions which can be used to measure, represent culture and predict cultural behaviours.	No justification for comprehensiveness and validity especially when applied on the organisational level.
Cultural Typologies e.g. the Competing Values Framework:.	Evaluates cultures based on a few criteria and classifies culture into different typologies.	No justification of what set of criteria to use to classify culture into different types. Wide range of typologies exists.
Structural Analysis: e.g. System of meaning; domination and legitimation.	Regard culture as a part of social system and is constituted by structural properties. Measure culture in terms of structure of signification, domination and legitimation from the behavioural manifestation in system of meaning, power and moral sanction.	Solid theoretical grounding, offers a common instrument to analyse culture in different settings. Concept of duality, time and space and reflexivity addresses the emergent, dynamic and reciprocal nature of Culture/IT interaction. Difficult to conduct .
Interpretive/ Grounded:	No prior conceptualisation of culture, Culture is measured through subjective interpretation of the authors based on the study findings.	No theoretical grounding, few justifications about the validity or accuracy of interpretation.

Culture has also been interpreted through structural analysis guided by structuration theory. This type of conceptualisation sees culture as a social system and therefore possesses structural properties (Bate 1984; Robey and Azevedo 1994). As a result, culture is constituted by its structures of signification, domination and legitimation, which is manifested through the system of meaning, power and moral sanction in the social actors' daily actions (Montealegre 1997; Orlikowski and Robey 1991). It provides a relatively more systematic and comprehensive approach for measuring culture and has been regarded as having the advantage of solid, theoretical grounding (Sahay and Robey 1996; Witmer 1997). However, this type of interpretation is the least utilised among the existing studies given the research complexity and challenges inherent in the structuration theory (Pozzebon and Pinsonneault 2005).

The final type of conceptualisation does not rely on any prior constructs to define culture. In contrast to the conceptualisations, it is mostly used in inductive studies based on grounded theory. Authors make subjective interpretations of the behaviours observed to provide explanation about the characteristics and nature of the culture under examination (Coombs et al. 1992; Madon 1992).

As summarised in Table 7, the culture dimension and typology conceptualisations are not suitable due to the lack of justification for their validity and reliability. Currently a wide range of cultural dimensions and typologies exist within the literature and different labels have been employed to describe similar culture values and beliefs. There is no consensus regarding what is a reasonable set of values and beliefs to constitute culture (Straub et al. 2002). Without convincing justification of their comprehensiveness and reliability, adopting any set of culture value dimension or typology classification threatens to compromise the quality of data interpretation and consequently yield an inaccurate/incomplete measurement of organisational culture. The grounded interpretation on the other hand lacks theoretical grounding to lend validity and systematic process to the inductive interpretation of data collected. Thus, the rigor and validity of the resulting findings are difficult to justify.

The structuralist analysis is regarded as the most suitable conceptualisation scheme to guide data collection and interpretation. Its grounding in structuration theory offers it a degree of systemic process that can be applied to investigate the IS-culture relationship in various settings. The key concepts of duality, time and space and reflexivity address the emergent, dynamic and reciprocal characteristics of the IS-culture interaction. As demonstrated in the few exiting structuralist examinations of culture, the structuralist framework provides a more reliable, comprehensive and robust cultural conceptualisation framework in comparison with the available alternatives (Riley 1983; Robey and Azevedo 1994; Witmer 1997; Walsham 2002).

CONCLUSION

The study of the IS-culture relationship is an important stream of research to understand the impacts of technology on organisations. Our review of the empirical IS-culture research highlights the need to address the dynamic, reciprocal and emergent nature of the IS-culture interaction. A combination of interview and observation techniques for data collection, coupled with a structuralist analysis will be effective in helping researchers capture the dynamic, reciprocal and emergent nature of IS-organisational culture interaction.

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ACKNOWLEDGEMENTS

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