

Impact of appropriation and participation on decision outcomes03:02
2005, Jul

Sadasivan, P. (2005). Impact of appropriation and participation on decision outcomes. *Bulletin of Applied Computing and Information Technology*, 3(2). Retrieved June 2, 2015 from http://www.citrenz.ac.nz/bacit/0302/2005Sadasivan_Appropriation.htm

Abstract

The efficiency of Group Decision Support Systems (GDSS) and other related collaborative systems is an aid to globalisation. Research on GDSS has been proceeding for more than fifteen years now and many theories have emerged over this time.

The purpose of this study was to identify the impact of appropriation of technology and participation by groups on decision outcomes. The data used for this study was from collaborative online trials involving students from Sweden and New Zealand. During this trial, a database was set up to support work from different collaborating groups, where groups had a common task and had to achieve consensus. There were five groups with three streams/subgroups each. Each group was assigned a topic. The framework used for this study was Adaptive Structuration Theory (AST), which has its roots in Anthony Giddens Structuration Theory (DeSanctis & Poole, 1994).

The study revealed that there was a major difference in the granularity and the number of threads indicating participation. The outcome in each case was positive. This indicates that in spite of inadequate participation there can still be a positive outcome. This observation leads to the suggestion of a slight modification to the existing appropriation model.

Keywords

Group Decision Support Systems, GDSS

1. Introduction

Information technologies are changing in all dimensions at a very rapid pace. These changes have not only impacted the technology itself, but also the way organisations and individuals function. These advanced technologies support co-ordination and interpersonal communication rather than simply supporting business (Chin, Gopal & Salisbury, 1997). These advances are making globalisation easier, leading to a distributed organisational structure. This change is reliant in part on the efficiency of Group Decision Support Systems (GDSS) and other related collaborative systems.

Research on GDSS has been proceeding for more than fifteen years now and many theories have emerged. Ideally, a GDSS aims to improve the process of decision making by removing communication barriers. It is perceived that decision-making becomes more difficult as it moves from an individual to a group setting due to process losses (Steiner, cited in DeSanctis, 1996). The factors influencing group problem solving include: reluctance to participate, inconsistent views about the problem's components and their relationships, undue dominance by one individual in the group, tendency toward premature convergence, unproductive avoidance or escalation of conflict, and issues of leadership. (Hackman & Morris cited in DeSanctis, 1996). It is difficult to observe an appropriation process (Ollman, 1998) as it is subtle, but group interaction or participation is evidence of it. Overall, appropriation and participation have considerable impact on the decision outcome (DeSanctis, 1996). It is beneficial to look at the impact that these factors can have on decision outcomes as this will help us consolidate appropriation of structures so that group decision outcomes are appropriate and reliable. One area that has not been thoroughly researched is the impact of member participation in decision processes on group decision outcomes.

This study researches the impact of faithfulness of appropriation and participation by groups on decision outcomes. It looks at the discussions by group members to arrive at a decision while using

GDSS for Collaborative learning. Using Adaptive Structuration Theory (AST) (DeSanctis & Poole, 1994), a micro-level analysis of appropriation was undertaken.

2. Adaptive Structuration Theory

AST has its roots in Anthony Giddens' Structuration theory (DeSanctis & Poole, 1994), in which he posits that human action influences and alters institutional arrangements or structures. This theory is formulated as "the production and reproduction of the social systems through members' use of rules and resources in interaction". DeSanctis and Poole (1994) adapted Giddens' theory to study the interaction of groups and organisations with information technology, and called it Adaptive Structuration Theory.

AST criticises the techno-centric view of technology use and emphasises the social aspects. Groups and organisations using information technology for their work dynamically create perceptions about the role and utility of the technology, and how it can be applied to their activities. These perceptions can vary widely across groups and can influence how technology is used and hence mediate its impact on group outcomes (Sikkel, Ruel & Wieringa, 1999).

AST is a theory that puts human behaviour in the context of technology and focuses on a groups' reaction and iterative modification of reactions and adaptation to information technologies. Adaptation is revealed in the interpersonal communication within groups. The main domain of this theory is group interaction, which is basically participation, in the context of social technology (Poole & DeSanctis, 1989).

AST looks into the process of human usage of computer systems and at the nature of group-computer interaction. Group use of technology is more an adjustment process, or adaptation. The key to understanding the functioning of GDSS is to understand the groups' adaptation to a technology (Poole & DeSanctis, 1989).

Group members may either use the GDSS in the intended way or in a contrary way, bringing both expected and unexpected consequences. It is generally difficult to expect groups to employ a technology in a pre-defined way. There are times when groups alter systems and enact socio-technical change within the group. AST defines this process as appropriation (Poole & DeSanctis, 1989)

2.1 Appropriation

To appropriate an object means to use it constructively, to incorporate it into one's life, for better or worse (Ollman, 1998).

Ideally, all effects of a technology, including a GDSS, depend on appropriation of the technology (Poole & DeSanctis, 1989). By viewing appropriation as part of AST, we can understand appropriation in a clearer way, as the theory focuses on actions and interactions.

2.2 Core Assumptions and Statements

AST is a viable approach for studying the role of advanced information technologies in organisational change. AST examines the change process from two different angles, namely, a. the types of structures that are provided by the advanced technologies and b. the structures that actually emerge from human action as people interact with these technologies.

The theory of Structuration deals with the evolution and development of groups and organisations. It views groups or organisations as systems with observable patterns of relationship and communicative interaction among people creating structures. Systems are produced from actions by people creating structures i.e. sets of rules and resources. Systems and structures exist in a dual relationship with each other, such that they tend to produce and reproduce each other in an ongoing cycle, which is referred as the "Structuration process". The Structuration process can be very stable, or it can change substantially over time. It is useful to consider groups and organisations from a Structuration perspective (DeSanctis & Poole, 1994), as in doing so we will be able to understand the relative balance in the deterministic influences and wilful choices that highlight a groups' unique identity. It clarifies the evolutionary character of groups and organisations and suggests how members may be able to exercise more influence than their own perceived capabilities.

DeSanctis and Poole(1994), adopted this theory to study Electronic Meeting Systems (EMS). Structuration is the process by which groups create and maintain a social system through the application of structures, which are rule and resource provided. The choice of structures used depends on how groups appropriate the structures provided. Appropriation, therefore, creates structures in use that may vary from group to group (Chin, Gopal & Salisbury, 1997).

3. Research Methodology

The data and analysis for this study are explained in the following sub sections.

3.1 Data Used

The data used for this study was from collaborative trials that involved students from Sweden and New Zealand. During this collaborative trial, a database was set up to support work from different collaborating groups, where groups had to evaluate and rank a set of given websites. There were five groups with three streams/subgroups each. Each group was assigned a topic. The topics determined the websites the groups would be evaluating and ranking. The groups, streams and their discussion threads are given in Table 1.

Table 1. Collaborative Trial Statistics (DeSanctis & Poole, 1994)

Group	Stream	Discussion Thread(s)	Members Involved
Data Mining (DM)	A-1	2	2
	B-1	3	6
	C-1	5	6
Data Warehouse (DW)	A-2	3	3
	B-2	2	5
	C-2	4	6
Expert Systems (ES)	A-3	1	3
	B-3	2	5
	C-3	5	7
Intelligent Systems (IS)	A-4	1	1
	B-4	6	6
	C-4	3	3
Neural Networks (NN)	A-5	6	4
	B-5	2	3
	C-5	0	DK

This study looks at all five groups. As part of data collection, the interactions of group members were closely examined. This was available through the discussion threads created by each member either initiating a discussion or responding to one. Subsequent to data collection, the discussions were closely read and a micro analysis was performed.

3.2 Micro Analysis

Micro analysis examines the appropriation of technology structures as it occurs in sentences, turns of speech, or other specific speech acts (DeSanctis & Poole, 1994).

In this study, as indicated above, the discussions of group members to arrive at a decision while using GDSS for collaborative learning, was considered. The approach indicated by DeSanctis & Poole (1994) as depicted in their tables 6a & 6b was followed.

The appropriation of technology structures was examined by micro analysis mainly through the discussions by group members. This indicates the levels of participation, as there is a direct relationship between appropriation and participation (DeSanctis & Poole, 1994) .

The attitude the group displays as technology structures are appropriated was also looked into. This further consolidates observations about the levels of participation. Consideration of data from different groups also enabled a comparison of appropriation. In order to make analysis systematic, and as suggested by DeSanctis and Poole (1994), the ranges of possible appropriations were identified and speech acts were classified according to that scheme. The units of analysis were discussions and meeting phases. During discussions, appropriation moves in terms of faithful versus unfaithful appropriation were considered. In meeting phases instrumental uses of structures and the attitudes toward structures were measured. The structure sources, types and subtypes taken into account are shown in Tables 2 and 3 respectively (DeSanctis & Poole, 1994).

Table 2 shows the major sources of structure for groups as the interaction takes place with advanced information technology. Broadly they are: the technology, the tasks, and the organisational environment. On application of these structures, their outputs become additional sources of structure. Once groups enter the data into the GDSS, the information generated by the system becomes another source of social structure (DeSanctis & Poole, 1994).

Table 2. Structure Sources (DeSanctis & Poole, 1994)

Structure Source	Definition
AIT (A)	Advanced information technology including hardware, software and procedures
AIT Outputs (AO)	Data, text, or other results produced by AIT software following input by group members
Task (T)	The results of operating on task data or procedures; the results of completing all or parts of a task
Environment (E)	Social knowledge or rules of action drawn from the organisation or society at large
Environment Outputs (EO)	The results of applying knowledge or rules drawn from the environment

Table 3 shows four general types of appropriation moves and the types and subtypes within each of these moves. Any given discussion in the group may include one or more of these moves (DeSanctis & Poole, 1994). For micro analysis, these types and subtypes were used along with the structures. Following all the guidelines given by DeSanctis & Poole (1994), effort was made to identify structures that were appropriated and also to find out how the appropriation was performed.

Table 3. Types and Subtypes (DeSanctis & Poole, 1994)

Appropriation Moves	Types	Subtypes
Direct Use	1.Direct Appropriation	a. Explicit b. Implicit c. Bid
Relates to Other Structures	2.Substitution	a. Part b. Related c. *Unrelated
	3.Combination	a. Composition b. *Paradox c. Corrective
	4.Enlargement	a. Positive b. Negative
	5.Contrast	a. Contrary b. Favoured c. None favoured d. Criticism
Constrain the Structure	6.Constraint	a. Definition b. Command c. Diagnosis d. Ordering e. Queries f. Closure g. Status report h. Status request
Express Judgements about the Structure	7.Affirmation	a. Agreement b. Bid agree c. Agree reject d. Compliment
	8.Negation	a. Reject b. Indirect c. Bid reject
	9.Neutrality	
* Represents unfaithful appropriation; all others are faithful		

DeSanctis and Poole (1994), state that social interaction is a key determinant of social outcome. Participation or the level of interaction is indicated by appropriation, and it influences the outcome. The main intention of this study was to ascertain the extent of its influence. The micro analysis of appropriation done for this study is summarised and presented in Table 4.

Table 4. Summary of Micro Analysis of Appropriation

Sources of Structure	Appr. Moves	Group	Instances
AIT Outputs (AO)	7a	C-1	1
		C-2	2
		B-2	2
		C-3	1
		B-4	4
		C-4	1
		A-5	1
AIT (A)	7a	B-1	2
AIT (A)	6a	B-1	1
		C-2	2
		A-3	1
		C-3	2
		C-4	1
		A-5	2
		B-5	1
AIT (A)	6b	A-4	1
		C-4	1
AIT (A)	8b	B-4	1
AIT (A) - Task (T)	5d	A-1	1
		B-3	2
		B-4	1
AIT (A) - Task (T)	5b	C-3	2
Task (T)	1a	C-1	1
Task (T)	1b	A-2	1
Task (T)	8a	A-5	1
		B-5	1
Environment Outputs (EO)	8a	A-5	2

The results illustrate a clear approach to identifying group response to Advanced Information Technology (AIT) and other structures. Each appropriation move can be described in terms of the source of structure (Table 2) and appropriation type and subtype (Table 3). It very clearly shows the number of times a structure was appropriated by a group in each appropriation move. The goal was to identify what structures were being appropriated and how they were appropriated. Dominant patterns of appropriation in the groups associated with individual speech acts related to meeting phases were used for summarising the appropriation and actions in the table. As this table is a summary, the actual text posted in threads is not displayed.

4. Discussion

The illustration in Table 4 indicates that the majority of the streams/subgroups had a negligible number of disagreements. While looking into the results furnished in Table 4, it can be clearly seen that among all the structures, AO (AIT Outputs) and A (AIT) were appropriated the highest number of times. In AO appropriation, the move was either, direct and explicit or affirmation and agreement. This shows the appropriation of data, text, or other results produced by AIT software following input by group members. Looking into the overall discussions it can be seen that, Subgroups A5 and B5 had around 50 per cent of discussion with disagreement and all the other Subgroups, except B-4, had no discussions with disagreements. Subgroup C-5 did not have any discussions at all. It could be presumed that those groups, which had very little discussion, had used some other mode of communication, for example, emails. This was further clarified during discussions with the course/module lecturers. One of the issues most noticeable here is that even in case of disagreements, there were no subsequent discussions. Why the group did not use the same mode of communication again is an area to be researched. It could be because they were not satisfied with using that system. This is only a presumption as there is no evidence to support this. But the overall amount of discussion by each subgroup is low. The conclusion of the discussions, as found in the data, indicates agreement by group members. It would suggest that all 15 streams were consistent with the spirit of the GDSS.

The mode in which structures are appropriated is determined along three dimensions, namely: faithfulness of that appropriation, the group's attitudes towards the GDSS, and the groups' level of consensus on the appropriation. Faithfulness refers to the extent to which a group uses a GDSS in the spirit in which it is intended to be used. *Spirit is the general goals and attitudes that the*

technology aims to promote (DeSanctis & Poole, 1994). A faithful appropriation means adhering to the spirit. Keeping this in mind, as the usage of GDSS by the Streams was meagre, it could be said that these groups did not have the right attitude towards the use of the GDSS. It also indicates that they had a very low level of respect towards the system. DeSanctis & Poole (1994) suggests that for a GDSS to have its intended effect, its structure should be appropriated in a stable manner. For an appropriation to be stable, the GDSS should be faithfully appropriated, there should be a high level of consensus on appropriation, and the stream's attitudes toward the technology should be positive. In this instance, except Stream's C-1, C-2, C-3, B-4 and A-5 (refer Table 4), all other streams did not have a positive attitude towards the system. Therefore, it is fair to overrule the earlier observation and state that the groups did not appropriate the GDSS. Moreover, the final ranking of the websites i.e. the outcome of the discussions and trials done by these streams, are clearly questionable. Therefore, the efficiency, quality, consensus as well as the commitment of the decision outcomes can be questioned.

DeSanctis and Poole (1994), state that, if interactions by groups are inconsistent with the structural potential of the technology and surrounding conditions, then the outcomes of groups using the structure will be very hard to predict and overall can be unfavourable. Groups make choices as to how they use technology or other structures. The process of appropriation can be subtle and difficult to observe, but it is clearly evidenced in the interaction that formulates the group decision process. DeSanctis and Poole (1994), mention improvements in the group decision process, which happens when participation and idea-generation by group members increases. Such improvements are considered to lead towards more reliable outcomes. In the collaborative trials discussed in this study, such improvements are not evident as the discussions were not very productive and not many ideas were generated.

Another point that consolidates this, is the length of discussions. It was observed that in some of the discussions, the details or explanations provided by members were substantial whereas in some instances they were very brief. This clearly shows the level of interaction and participation. Looking into the draft results entered by each member of the stream, it can be said that the majority of members from streams who had more than 4 discussion threads changed their draft decisions after discussions, whereas, others hardly changed at all. There is a clear indication that as the level of participation increased, there were changes in the understanding and perceptions of the stream members. This again agrees with the observations and propositions put forward by DeSanctis and Poole (1994).

DeSanctis and Poole (1994), mention the importance of stable appropriation of structures on the intended effects of the GDSS. The proponents of AST basically assume that stable or consistent appropriation is more likely to reflect a positive experience for a group, as the intended impact of the use of the GDSS are positive in nature. However, it is possible that an improper appropriation of GDSS could still lead to a positive and productive outcome, especially in cases where groups are able to overcome dissatisfactions with the system to achieve their goals. In light of this, a slightly modified model can be considered, as given in Figure 1.

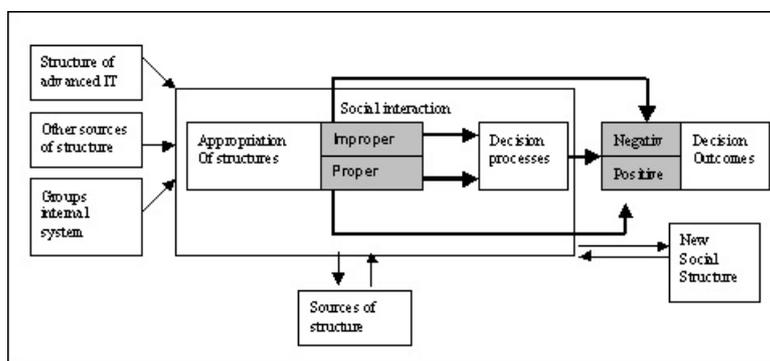


Figure 1: Modified Model of Appropriation

The model in Figure 1 expands on the model that was proposed by DeSanctis and Poole (1994). Their model concentrates on how structures will be appropriated and what the ultimate outcome of that appropriation will be.

The model shown in Figure 1 expands on that by demarcating the clear possibilities of a proper or improper appropriation leading to either a positive or a negative decision outcome. In cases where the appropriation is not proper, a positive outcome can still be expected, though the validity and

actual benefit of such an outcome is questionable. In cases where the appropriation is proper, there are also possibilities of a negative outcome. This is clearly differentiated in Figure 1, by using shaded areas and thick lines. The earlier model did not consider such possibilities. This article however does not look into the validity of such outcomes, but this is an area that could be researched.

As indicated by DeSanctis and Poole (1994), appropriation processes are complex and subtle, so measurement approaches can be difficult. The micro analysis coding done for this study is based purely on a standard set of rules and only considers a very small category of structures. The illustration is based on available discussion threads. Any other mode of communication has not been considered mainly because it is not known at this time. A consideration of other modes of communication would have added an interesting facet to the research as a whole.

5. Conclusion

The result of this study points to a few new facets concerning the use of AST as a theoretical foundation for research into GDSS. Based on the limited analysis of the group decision process, it appears probable that in spite of inadequate appropriation of some features of the technology, the decision outcomes can be positive. This is inconsistent with the observations made by the proponents of AST. From this observation, the appropriation model could be slightly modified. This study opens up some new areas for research, such as participation and stability, which have some conflicting tendencies. The proponents of AST were not totally unaware of these aspects but their model was slightly restrictive in terms of accommodating the effects of inadequate participation and the effects of a lack of stability.

AST is a theory of merit and considerable advantage. It could be used to analyse the advent of various technological innovations, and show how structures around these innovations penetrated the respective societies. AST is also a good model for analysing the utilisation and penetration of new media technologies in organisations.

To date, there are few studies that examine the appropriation process of GDSS technologies when groups are presented with different structures in the form of interaction and co-ordination. This area is worth consideration by anybody who has a flair for collaborative computing.

Acknowledgements

The author wishes to thank Tony Clear, Diana Kassabova and Petro Smith for all their support and advice. The comments and the suggestions of the reviewers are appreciated with thanks, as well as contribution by Catriona Carruthers in editing and formatting the article.

References

- Chin, W.Y., Gopal, A., & Salisbury, W.D. (1997) Advancing the Theory of Adaptive Structuration: The Development of a Scale to Measure Faithfulness of Appropriation, *Information Systems Research*, 8(4), pp. 342-367.
- DeSanctis, G. (1996) *Shifting Foundations in Group Support System Research*. In L. M. Jessup & J. Valacich (Eds.), *Group Support Systems: New Perspectives*, pp. 97-111, New York: Macmillan.
- DeSanctis, G., & Poole, M.S. (1994) Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory, *Organization Science*, 5(2), pp. 121-147.
- Poole, M.S., & DeSanctis, G. (1989). Use of Group Decision Support Systems as an Appropriation Process, *Proceedings of the Twenty-Second Annual Hawaii International Conference*, 4, pp. 149-157.
- Ollman, B. (1998) *Alienation: Marx's Conception of Man in Capitalist Society*, Cambridge: Cambridge University Press.
- Sikkel, K., Ruel, H., & Wieringa, R. (1999) Towards a Method for Evolutionary Implementation of Groupware, *Proceedings of the fifth international workshop on requirements engineering: Foundation for software quality*, pp. 187-192.

use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author(s) also grant a non-exclusive licence to NACCQ to publish this document in full on the World Wide Web (prime sites and mirrors) and in printed form within the Bulletin of Applied Computing and Information Technology. Authors retain their individual intellectual property rights.

Copyright ©2005 NACCQ.
Krassie Petrova, Michael Verhaart & David Parry (Eds.)
An Open Access Journal, DOAJ # 11764120 , (✓ zotero)