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Developing a GSS Appropriation Model

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ABSTRACT

This paper proposes an experiment using GSS in a longitudinal study to develop an appropriation model using structural equation modeling. The study will examine the relationship of the three levels of appropriation along with outcome and decision satisfaction, determinants of system success.

Keywords

Adaptive structuration, appropriation, group support systems

INTRODUCTION

Appropriation of advanced information technologies (AIT) has been shown to be an important determinant of the technology's effective implementation in an organization in Adaptive Structuration Theory (AST). Within AST, Appropriation Theory is opening up new areas in one specific AIT, group support systems (GSS). Research has shown that the stability of GSS is an important factor for an effective GSS, one that exudes higher outcome quality, greater satisfaction, etc. GSS stability can be reached if it is faithfully appropriated, there is a high level of consensus on appropriation, and the group's attitudes toward the technology are positive (Gopal, Bostrom, and Chin, 1992). This paper presents an appropriation model using structural equation modeling to examine the relationship of the three levels of appropriation along with outcome and decision satisfaction, determinants of system success.

Dennis et al. (2001) built upon the task/technology fit model (Zigurs & Buckland, 1998) to include appropriation support, another important area to examine when defining the effectiveness of a GSS to enhance group performance. Appropriation is the degree to which groups adopt the GSS structures as intended by the meeting designer. In MIS literature three measures have been developed for three dimensions of appropriation: faithfulness of appropriation, consensus on appropriation, and attitude on appropriation. The proposed research model addresses the dimensions of appropriation. Appropriation support is included in the theoretical model but not tested in the current study.

LITERATURE REVIEW

Adaptive Structuration Theory

Appropriation Theory is built on Adaptive Structuration Theory (AST) was proposed by DeSanctis and Poole (1994) as a viable approach for examining the role of advance information technologies (e.g. GSS) in organizational change. AST examines (1) the types of structures that are provided by advanced technologies, and (2) the structures that actually emerge in human action as people interact with these technologies.

Appropriation Theory

There are several types of GSS available to have the potential to change the nature of information exchange and decision processes during group discussion (DeSanctis and Gallupe, 1987, Nunamaker et al., 1991). The specific tools within the GSS, the social structures, enable or encourage groups to interact in a certain manner. Structural features are the specific capabilities that the GSS offers (DeSanctis and Poole, 1994). Zigurs and Buckland (1998) place GSS social structures into three categories: communication support, information processing support, and process structure or appropriation structure.

Types of appropriation support for GSS technology include facilitation, software restrictiveness and training. The Fit-

Appropriation Model (Dennis et al., 2001) posits that the appropriation support impacts the degree of appropriation.

Poole and DeSanctis (1990) suggest that for a GSS to have its intended effects (higher outcome quality, more satisfaction, etc.) its structures should be appropriated in a stable manner. This stability is reached in a GSS when it is faithfully appropriated, there is a high level of consensus on appropriation, and the group's attitudes toward the technology are positive (Gopal, Bostrom, and Chin, 1992).

Faithfulness

Faithfulness may be characterized on a range from faithful to unfaithful (DeSanctis and Poole, 1994). A faithful appropriation occurs when those using the EMS follow the spirit of the system, while an unfaithful appropriation results when the EMS is used in a manner inconsistent with its spirit (Chin, Gopal, and Salisbury, 1997). The concept of spirit is an interesting one. The spirit may be described as the general objectives and procedures that the EMS aims to promote (Poole and DeSanctis, 1990). Although, the concept of spirit is a subtle one, Chin et al. (1997) developed scales to measure faithfulness of appropriation, anchored in their use of spirit.

H1: Faithfulness of appropriation positively influences outcome satisfaction.

H2: Faithfulness of appropriation positively influences process satisfaction.

Consensus

Consensus on appropriation is defined by the extent to which individuals agree on how to jointly use an AIT intervention (Poole and DeSanctis, 1992, DeSanctis and Poole, 1994). The agreement among individuals may exist a priori or develop as the technology is appropriated, but it is a prerequisite for users to effectively employ the technology (Salisbury, Chin, Gopal, and Newsted, 2002). Consensus on appropriation is restricted to technologies that call for explicit agreement regarding use (Chin et al., 1997). This consensus is applicable to electronic meeting systems but not in the case of all other advanced information technologies.

H3: Consensus on appropriation positively influences outcome satisfaction.

H4: Consensus on appropriation positively influences process satisfaction.

Attitude

Gopal et al. (1992) consider attitude to be the vehicle that reflects the stability of the group's appropriation process. AST has defined three attitude variables: *level of comfort*, *degree of respect* (Poole and DeSanctis, 1989; 1990), and *challenge* (Sambamurthy, 1989). These attitude dimensions proposed in AST (Poole and DeSanctis, 1989; 1990, Sambamurthy, 1989) were shown to reflect appropriation patterns better than attitude dimensions borrowed from other IT literature (e.g. ease of use, usefulness, compatibility). The AST attitude dimensions best reflect the formation of attitudes during a meeting.

H5: Attitudes on appropriation positively influence outcome satisfaction.

H6: Attitudes on appropriation positively influence outcome satisfaction.

Time

Groups are expected to better appropriate the GSS technology over time. The time element is introduced and is expected to have a significant relationship with the three areas of appropriation that are being investigated.

H7: Time period significantly influence faithfulness of appropriation.

H8: Time period significantly influence consensus of appropriation.

H9: Time period significantly influence attitude on appropriation.

METHODOLOGY

This research study will employ an experiment using two classes of approximately 100 undergraduate business students each, comprising 40-50 groups of 4-5 students each. Students will participate in the experiment as part of a class project for credit. Random assignment will be utilized to ensure an even balance of skill, gender, and computer competency. A longitudinal experiment will be conducted using the two classes held in consecutive semesters at a large midwestern university. At identical intervals throughout the semester, the students will take part in group decision tasks with the first semester class

using a traditional meeting format while the second semester students will use a group support system to conduct the discussion. A seven-point Likert-type scale will be conducted post-experiment.

Groups will use the Lotus Sametime group support systems tool accessed in a computer lab through a web browser. The groups will be given the problem set to read and then discuss with the aid of the GSS.

Experimental Procedure

Scenarios used in the group tasks will coincide with topics covered in the class. The topics will cover a range of MIS-related issues. The instructor will hand out copies of the scenario to each student and then read it aloud to the class, asking for any clarification. The face-to-face group will then proceed to discuss the scenarios in a traditional round table manner while the GSS group will use Lotus SameTime from IBM.

All eight scenarios will be given 60 minutes to complete the decision task. To make the students more individually accountable, an in-class writing assignment will follow the discussions. The questionnaire will be given immediately after the scenario discussion and prior to the in-class writing assignments. Five minutes will be allocated for the questionnaire and ten minutes for the in-class writing assignments. Time period is a non-metric variable (1-8) determined actual number of the meeting.

Outcome and process satisfaction will be measured with Reinig's (2003) satisfaction scale. Outcome and process satisfaction constructs are composed of five questions on a five-point scale that taps perceptions related to solution satisfaction. This satisfaction instrument was developed specifically for use in GSS research.

The nature of a controlled laboratory environment for the study as well as the use of undergraduate university students may limit the external validity of the study. The external validity limitation is overcome by the nature of the study in that experience is not an important factor for participants in the study.

Data Analysis

Testing for construct validity for structural equation models often begins with an exploratory factor analysis (EFA). Cronbach's alpha for the constructs will also be measured to meet the acceptable threshold for reliability (Bernardi, 1994; Cortina, 1993; Nunnally, 1982).

The data will then be analyzed using structural equation modeling. The path diagram is shown in Figure 1 (*see Appendix*). Repeated measures were used to test the temporal influences versus the more traditional ad-hoc/one-shot design, therefore, the assumption of independent observations is brought into question. Linearity assumptions were met, and there was no missing data. It is generally recognized that all SEM assumptions are not satisfied in practice (Dillon & Goldstein, 1984), yet the use of SEM was found to be appropriate and justifiable for testing the hypotheses.

Fit measure	Recommended value	LISREL result
χ^2	$p > 0.05$	
χ^2/df	< 5.00	
GFI	> 0.90	
AGFI	> 0.90	
RMSEA	< 0.10	

Table 1. Fit Measures to be Examined

Structural equation analysis will be performed on the model using LISREL 8.52. The model contains two uncorrelated exogenous variables (i.e. Appropriation Support and time period). Time period is categorical represented as one through eight, based on the time period of the task. The item indicators for the latent, endogenous constructs are expected to be significant at the $p < 0.000$ level.

A variety of fit measures were used to examine the appropriateness of the model and presented in Table 1, showing both the recommended value and the results obtained using LISREL. Overall the model is expected to be suitable and valid. Significant, standardized, path coefficients appear in Figure 1 (see Appendix).

CONCLUSION

The Fit-Appropriation Model as proposed by Dennis et al. (2001) will be tested when this study is carried to fruition. This author expects all the relationships that have been proposed to be significant due to the strong relationships expected between appropriation support and dimensions of appropriation, as well as the dimensions of appropriation influencing performance measures such as outcome and process satisfaction. The study furthers the work in the appropriation domain of Adaptive Structuration Theory, furthering the goal of providing a full explanatory model for advanced information technologies such as group support systems.

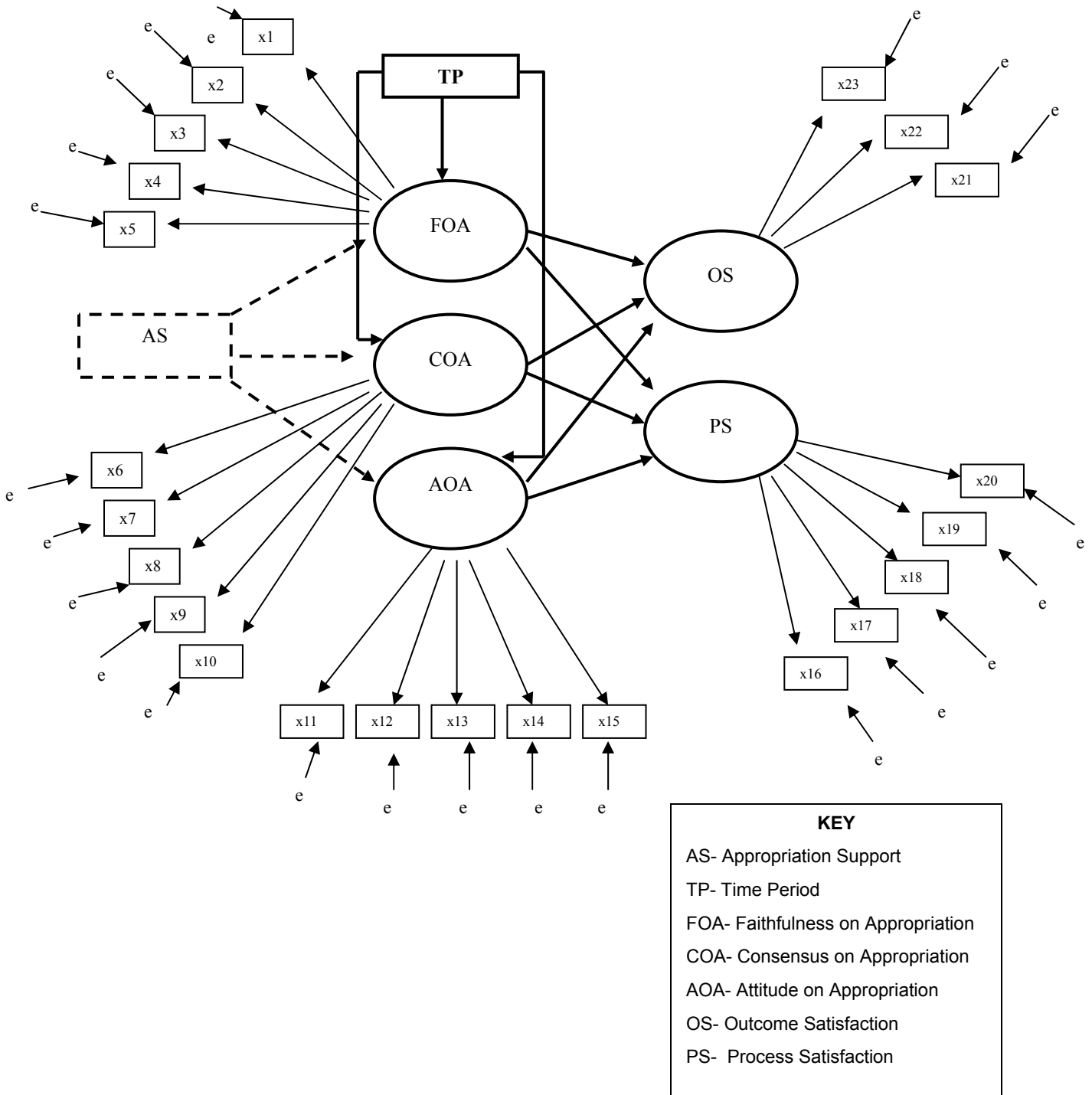
REFERENCES

1. Anson, R., Bostrom, R., & Wynne, B. (1995). An experiment assessing group support system and facilitator effects on meeting outcomes. *Management Science*, 41, 189-208.
2. Barley, S.R. (1988). Institutionalization as structuration: Methods and analytic strategies for studying links between action and structure. *Paper presented at the Conference on Longitudinal Field Research Methods for Studying Organizational Processes*, Austin, TX, Sep. 14-16.
3. Benbasat, I., DeSanctis, G., and Nault, B.R. (1993). Empirical research in managerial support systems: A review and assessment. In C. Holsapple and A. Whinston (Eds), *Recent developments in decision support systems* (pp. 383-437). Springer-Verlag: Berlin.
4. Bernardi, R.A. (1994). Validating research results when Cronbach's alpha is below .70: A methodological procedure. *Educational and Psychological Measurement*, 54, 766-775.
5. Bui, T., and Sivasankaran, T.R. (1990). Relation between GDSS use and group task complexity. *Proceedings of the Eighteenth International Conference on Information Systems*, 3, 554-563.
6. Campbell, D.J. (1998). Task complexity: A review and analysis. *Academy of Management Review*, 13, 40-52.
7. Chidambaram, L., & Jones, B. (1993). Impact of communication medium and computer support on group perceptions and performance: A comparison of face-to-face and dispersed meetings. *MIS Quarterly*, 17, 465-491.
8. Chin, W.W., 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, 342-367.
9. Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78, 98-104.
10. Dennis, A.R., and Gallupe, R.B. (1993). A history of GSS empirical research: Lessons learned and future directions. In L.M. Jessup and J.S. Valacich (Eds.), *Group Support Systems: New Perspectives* (pp.59-77). Macmillan: New York.
11. Dennis, A.R., Wixom, B.H., and Vandenberg, R.J. (2001). Understanding fit and appropriation effects in group support systems via meta-analysis. *MIS Quarterly*, 25, 167-193.
12. DeSanctis, G. & Gallupe, R.B. (1987). A foundation for the study of group decision support systems. *Management Science*, 33, 589-609.
13. DeSanctis, G., & Poole, M.S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science*, 5, 121-147.
14. Dillon, W.R., & Goldstein, M. (1984). *Multivariate Analysis: Methods and Applications*. New York: Wiley.
15. Fjermestad, J. & Hiltz, S.R. (1999). An assessment of group support systems experimental research: Methodology and results. *Journal of Management Information Systems*, 15, 7-149.
16. Gallupe, R.B., Dennis, A.R., Cooper, W.H., Valacich, J.S., Bastianutti, L.M., & Nunamaker, J.F. (1992). Electronic brainstorming and group size. *Academy of Management Journal*, 35, 350-369.
16. Gopal, A. Bostrom, R.P., & Chin, W.W. (1992). Applying adaptive structuration theory to investigate the process of group support systems use. *Journal of Management Information Systems*, 9, 45-69.

17. Gutek, B.A., Bikson, T.K., & Mankin, D. (1984). Individual and organizational consequences of computer-based office information technology. In S. Oskamp (Ed.), *Applied Social Psychology Annual: Applications in Organizational Settings* (pp. 231-251). Sage: Beverly Hills, CA
18. Kline, T.J., and McGrath, J.L. (1999). A review of the groupware literature: Theories, methodologies, and a research agenda. *Canadian Psychology*, 40 (265-271).
19. Kling, R. (1980). Social analyses of computing: Theoretical perspectives. *Computing Surveys*, 12, 61-110.
- Meyer, J.W., & Rowan, B. (1991). Institutionalized organizations: Formal structure as myth and ceremony. In W.W. Powell and P.J. DiMaggio (Eds.), *The New Institutionalism in Organizational Analysis*, (pp. 41-62). University of Chicago Press: Chicago.
20. Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.
21. Nunamaker, J.F., Jr., Dennis, A.R., Valacich, J.S., Vogel, D.R., and George, J.F. (1991). Electronic meeting systems to support group work. *Communications of the ACM*, 34, 40-61.
22. Perrow, C. (1986). *Complex Organizations: A Critical Essay*, 3rd ed., Random House: New York.
23. Poole, M.S., and DeSanctis, G. (1989). Use of group decision support systems as an appropriation process. Proceedings of the Twenty-Second Annual Hawaii *International Conference on System Sciences*, January, 1989.
24. Poole, M.S., and DeSanctis, G. (1990). "Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration," *Organizations and Communication Technology*, Sage Publications, Newbury Park, CA, 1990; pp. 173-193.
25. Reinig, B.A. (2003). Toward an understanding of satisfaction with the process and outcomes of teamwork. *Journal of Management Information System*, 19, 65-83.
26. Sambamurthy, V. (1989). Supporting group performance during stakeholder analysis: The effects of alternative computer-based designed. Unpublished Ph.D. dissertation, University of Minnesota.
27. Salisbury, W.D., Chin, W.W., Gopal, A., & Newsted, P.R. (2002). Research report: Better theory through measurement-Developing a scale to capture consensus on appropriation. *Information Systems Research*, 13, 91-103.
28. Straus, S.G., & McGrath, J.E. (1994). Does the medium matter? The interaction of task type and technology on group performance and member reactions. *Journal of Applied Psychology*, 79, 87-97.
29. Ziguers, I., and Buckland, B.K. (1998). A theory of task/technology fit and group support systems effectiveness. *MIS Quarterly*, 22, 34-50.

APPENDIX

Figure 1



KEY	
AS-	Appropriation Support
TP-	Time Period
FOA-	Faithfulness on Appropriation
COA-	Consensus on Appropriation
AOA-	Attitude on Appropriation
OS-	Outcome Satisfaction
PS-	Process Satisfaction