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Classifying Information Systems Context Variables through a Review of Recent IS Research on how Context Affects Performance

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Abstract

The context within which an information system is developed, implemented, operated and managed has been a key focus in many IS performance studies. Thirty such studies are reviewed in this paper and a typology of IS context variables is proposed. Context variables are classified by (a) what IS organizational processes are the variables hypothesized to affect; (b) whether the variables are considered controllable, partially controllable, or uncontrollable; (c) whether the unit of analysis is at the individual, organizational, or market levels. It is shown that most of the context variables studied centred around the IS management process and were mostly uncontrollable. Few variables focussed on the individuals in the organization, and none on the industry/market level.

Keywords

IS research issues; IS research frameworks; organisational characteristics; organisational environment

INTRODUCTION

Why is it important to consider information systems (IS) context when we evaluate IS performance? One answer is that, put simply, context seems to affect performance.

In order to study, understand, or even improve IS performance, the context within which the IS exists is one important factor to consider.

This is a conclusion supported by Jayasuriya (1999) in his case study of the implementation of a computerized information system for health services in the Philippines. In his study, he concluded that the factors that led to the failure of this system included: "the ambiguity in the organization and in responsibility for the project, lack of capacity to undertake large information systems development projects and the inability to retain appropriate staff," (Jayasuriya, 1999:335). However, further analysis of the historical and contextual issues and the "interplay between the content, process and context … revealed that the content of the IS was not responsive to the changes in the wider health system," (*ibid*). Jayasuriya (1999) thus concluded that the case study confirmed the need to analyze and understand organizational, environmental, and cultural issues in transferring technology and managing IS in developing countries.

The importance of IS context in investigating IS performance has been recognized since the 1970s. In a 1973 paper on research agendas for Management Information Systems, Mason and Mitroff proposed that "an information system consists of at least one PERSON of a certain PSYCHOLOGICAL TYPE who faces a PROBLEM within some ORGANIZATIONAL CONTEXT for which he needs some EVIDENCE to arrive at a solution and that the evidence is made available to him through some MODE OF PRESENTATION," (Mason and Mitroff, 1973 in Ein-Dor and Segev, 1978:1064, emphasis in Ein-Dor and Segev).

From this statement, Mason and Mitroff (1973) discussed various research issues for each of the elements in the description of an information system (the elements are listed above in capital letters). Ein-Dor and Segev (1978) followed the research agenda proposed by Mason and Mitroff (1973) by writing a conceptual paper focusing on organizational context and its effect on MIS success. They presented 22 propositions involving 9 variables measuring organizational context.

Since then, organizational context and the ways in which it may influence IS success have been investigated in a number of empirical and conceptual studies (Fiedler, Grover *et al.*, 1996; Blanton, Watson *et al.*, 1992; Premkumar and King, 1994; Iivari, 1992; Weill and Olson, 1989). Many of these studies make use of the contingency approach towards studying organizations. This contingency approach has been defined as:

> *[an approach that attempts to] understand the interrelationships within and among subsystems as well as between the organization and its environment and to define patterns of relationships or configurations of variables. [The contingency approach] emphasizes the multivariate nature of organizations and attempts to understand how organizations operate under varying conditions and in specific situations. Contingency views are ultimately directed toward suggesting organizational designs and managerial actions most appropriate for specific situations.*
>
> (Kast and Rosenzweig, 1973:ix quoted in Kast and Rosenzweig, 1985:17-18)

From this definition, it is clear that the contingency approach recognizes the importance of context or 'environment'. When applied to IS research, the contingency approach suggests that:

> *… a number of variables influence the performance of information systems; the better the 'fit' between these variables and the design and use of the MIS, the better the MIS performance.*
>
> (Weill and Olson, 1989:63)

Contingency theory, however, has not been free from criticism. Some of the criticisms of contingency theory have focused on: (1) the assumptions implicit in the theory; and (2) the methodology of the studies (Weill and Olson, 1989). Contingency theory has been criticized for assuming organiations have "rational actors" who "perform in ways that are always in concert with the super-ordinate goal of organizational effectiveness." The argument continues, saying that having rational actors implies the presence of "goal consensus among decision makers within an organization … if the critical variables requiring 'fit' were known, organizational decision makers would adapt the organization to a better fit," (Weill and Olson, 1989:61). The criticism with this assumption is that organizations do not always have rational actors, that, in analyzing organizational behavior and outcomes, it is not possible to leave people with non-rational objectives out of the analysis. Thus, organizational research "must become more micro and bring in the values, perceptions, and attitudes of stakeholders who shape organizational behavior," (Argyris, 1964 in Weill and Olson, 1989:62).

Criticisms of the methodology of contingency studies state that "the contingency variables chosen in any one study account for only a small percentage of the variance in organizational performance," and that "most studies employ cross-sectional survey techniques requiring broad macro-level concepts (e.g., organizational structure) to be reduced to simple quantitative measures," (Weill and Olson, 1989:61).

Iivari (1992) offers a counter argument for the criticisms of the use of the theory in IS research. Iivari states that a particular limiting approach to interpreting the concept of "fit" has dominated IS contingency studies and, as such, there should be an expansion, rather than abandonment of the use of the theory. One of Iivari's recommendations involves defining different IS contexts for the IS development process.

If indeed organizational research must be more "micro," that more IS context variables must be included in a study, and that the conceptualization of IS context must involve defining different levels of IS context, how can this study contribute to that objective? This study contributes to that objective first by clarifying the concept of organisational context and how it relates to IS performance.

One important difference here is in the meaning placed on performance. In traditional research, performance is defined and measured in terms of outcome and impact (DeLone and McLean, 1992). Taking a broader view, performance will be conceptualized instead as a process, and it will be argued that taking this view has implications for any research

approach. With this in mind, the statement, "context affects performance" can be analysed using the question "how does context affect the process of performing?" rather than with the traditional question of "how does context affect the outcome of performing?"

CONTEXT AND THE IS ORGANISATIONAL SYSTEM

Context is defined in the second edition of the Australian Pocket Oxford dictionary as a "general setting" (1984:151). In the New Oxford mini-reference Dictionary and Thesaurus "context" is defined as "circumstances" (1995:125), which is a word found in the definition of "environment." Environment is defined as: "surrounding objects or circumstances; conditions under which any person or thing lives or is developed; influences modifying character, etc" (Australian Pocket Oxford Dictionary, 2nd ed., 1984:236).

Context thus can be said to be equivalent to "general setting, environment, or conditions." The concept of context begs the question, "context in relation to *what*?" In this paper, context is considered in relation to the processes an organization performs in order to produce desired organizational outcomes. We can define the IS organisational system as: a system of processes combining organizational structures, human and other resources for the purpose of managing, establishing, sustaining and using the information systems in the organization. This system includes a feedback mechanism in the form of an evaluation-learning process. Thus, in investigating context and its effect of IS performance, we consider the context of this IS organisational system (ISOS).

Specifically, ISOS context involves the context surrounding the ISOS processes, which are:

> *IS management processes – the tasks involved in the planning, organizing, budgeting, directing, monitoring and controlling the people, funding, technologies and activities associated with establishing, sustaining and using the information systems in the organization.*
>
> *IS development, implementation, maintenance, and operation (DIMO) processes – processes involved in designing and building an information system; installing a purchased, developed or adapted information system and making it ready for use; keeping the IS appropriate for intended use, by changing the functional or technical characteristics of the system; operating ISs to allow for the uninterrupted use of the IS, without changing functional or technical characteristics of the system.*
>
> *IS use – a set of activities that involve human interactions with the IS, such as inputting information, initiating processing, producing IS output, and using IS output in business functions.*
>
> *IS evaluation – the set of informal or formal activities that involve assessing the procedure, the outcome and the consequences of any of the ISOS processes according to a set of criteria identified by management. Evaluation involves establishing the evaluative criteria as well as the performance measures, assessing procedures, outcomes, or consequences, and analyzing and learning from the results.*

CLASSIFICATIONS OF IS CONTEXT IN LITERATURE

There are a number of ways that organizational context variables have been classified in IS literature. Mason and Mitroff (1973), in discussing factors affecting IS design, identify two aspects of organizational context that may have an interdependent relationship with IS design: structure and people. (Mason and Mitroff, 1973 in Ein-Dor and Segev, 1978:1064). Other researchers identify organizational context variables that not only include structure and people, but managerial system variables such as planning horizon, average length of strategic decision process, and variables referring to forces outside the organization, like availability of technology, rate of technological change in industry (Ein-Dor and Segev, 1978), and environmental uncertainty (Ford and Slocum, 1977, Miller, Glick *et al.*, 1991, Raymond, Pare *et al.*, 1995). Weill and Olson (1989) in their review of contingency theory in

MIS research, identified contingency variables that represented what other researchers would refer to as 'environment' or 'context'. These contingency variables are strategy, structure, size, environment, technology, task, and individual. Iivari (1992) reviewed studies relating context with IS characteristics and performance, and he described context in such classifications as: environment (e.g., uncertainty, predictability, complexity), technology (e.g. task diversity, task difficulty, information processing load), structure (e.g. hierarchy, decentralization, differentiation, integration), control systems (e.g. rules and procedures, planning time frame), and others (e.g. size, EDP experience, size of economic sector).

Classifying context variables by degree of controllability

One useful classification of organizational context variables is that proposed by Ein-Dor and Segev (1978). They proposed that organizational context variables can be categorized as *uncontrollable, partially controllable* and *controlled*. These categories of variables are useful in the sense that they can be used for evaluating the context of an MIS project before it is implemented and for analyzing problems or the feasibility of change in functioning systems.

Ein-Dor and Segev (1978) described uncontrollable variables as "those whose status is given with respect to the MIS, first because the time required to change their values is well beyond the time frame of MIS implementation, and second because there is very little the MIS unit can do to induce changes in these variables even in the long run; some of them are not under the control of the organization" (Ein-Dor and Segev, 1978:1066). The uncontrollable variables they identified are:

- Organizational size
- Organizational structure
- Organizational time frame
- The extra-organizational situation

Ein-Dor and Segev suggest that if the analysis of the uncontrollable variables reveals a "totally hostile front," there would be no use in proceeding with an implementation of a new system because it would appear to be doomed to failure. Implementation should be deferred to such a time when the environment is more "benevolent."

If the uncontrollable environment is considered "sufficiently benevolent" for a successful implementation to take place, the partially controllable variables should be considered.

The partially controllable variables are those which are "susceptible to change within a time frame compatible with that of the MIS; their exact values cannot be chosen at will, but changes in the desired direction can be induced." (Ein-Dor and Segev, 1978:1067) These variables are:

- Organizational resources
- Organizational maturity
- The psychological climate in the organization.

If the environment posed by these partially controllable variables is not benevolent, it is possible, as Ein-Dor and Segev point out, that programs be undertaken to modify this part of the environment in parallel with the implementation of the MIS. They even go as far as to say that the last two of these variables are affected by the success of the MIS, thus heightening their controllability. The reader is referred to their work for a more detailed explanation of these variables.

There remain variables in the environment which are completely under the control of the top management of the organization. These controlled variables are those "whose exact values or states can be determined by the organization with precision and at any time desirable" (Ein-Dor and Segev, 1978:1067). The variables in this category are:

- Rank and location of the responsible executive
- The steering committee

All the variables mentioned in Ein-Dor and Segev's (1978) paper have been conceptualized as part of organizational context. It is good to note though that their use of the term "organizational" context is in reference to the *whole* organization, and not just to the IS

organization. There is a difference when one refers to “IS organizational size” and “organizational size”. The former refers to the size of the IS unit while the latter refers to the size of the *whole* organization (also referred to here as the *host* organization). Organizational context, as conceptualized by Ein-Dor and Segev (1978) therefore comprises the context of the IS organization as well, but does not delve into the immediate context of the IS organization, which would include characteristics of the IS organization.

Ein-Dor and Segev (1978) posed a scheme that classified context variables by controllability. There is another way to classify context variables, and this would be by unit of analysis which can be either at the level of the individual, the organization, or the market.

Classifying context variables by unit of analysis

Swanson (1987), in a review of information systems studies using organization theory, suggested a typology of research questions based on two dimensions: the unit of analysis and the explanatory focus. He identified three levels of analysis: the individual, the organization, the market; and two explanatory foci: the determinants and the effects of information (system) use. With these two dimensions, he was able to identify six types of research questions, which are shown in Table 1.

	Explanatory Focus	
Unit of Analysis	**Determinants**	**Effects**
The individual	What are the determinants of an individual’s information (system) use?	What are the effects of an individual’s information (system) use?
The organization	What are the determinants of an organization’s information (system) use?	What are the effects of an organization’s information (system) use?
The market	What are the determinants of a market’s information (system) use?	What are the effects of a market’s information (system) use?

Table 1: Swanson’s typology of research questions (Source: Swanson, 1987:18)

Using the above typology, Swanson (1987) reviewed literature that answered each of the above questions, and was thus able to identify the determinants of IS use at the individual, organization, and market levels. It can be argued that a determinant in Swanson’s view is a context variable in the view of this study. Swanson’s review suggested that a determinant is a factor that influenced IS use in some way. For these factors to influence IS use, it stands to reason that these factors must have been present in some form in the context of IS use in order to influence it. Factors that Swanson (1987) listed as determinants were such as: user involvement in implementation, user psychological type, cognitive style (for the individual level), task uncertainty, task variety, task complexity, organization size (for the organization level), and the pursuit of competitive advantage (for the market level). It can be argued that each of these factors describes a quality or a condition of the elements involved in IS processes, specifically IS use, and hence, can be used to describe IS context.

The importance of context variable classifications

The classification of context variables is important in that:

1. Classifying context variables can help clarify the differences in the variables which can affect their treatment both in research and in the types of recommendations which are useful. For example, Ein-Dor and Segev’s scheme shows differences between controllable and uncontrollable variables and thus their recommendations consider these differences. If the uncontrollable variables are not “benevolent” then management must reconsider pushing through with a project. Swanson’s scheme identifying units of analysis helps clarify the focus of the research, as the units of analysis help determine research and statistical technique.

2. Using classes of context variables can help identify other context variables. For example, Swanson's market class of variables has only a few variables described under it, thus prompting Swanson to conclude that it is a field of study that merits more research, and is a promising ground for new insight.
3. Some classes of context variables have developed different theories compared to other classes of context variables. Contingency theory focuses on organizational structure variables while Social Cognitive Theory focuses on the individual.

Each of the classifications has their individual strengths. It can be argued that Ein-Dor and Segev's (1978) scheme is useful and practical. Swanson's (1987) scheme is comprehensive as it covers the individual, organizational, and market variables.

A TYPOLOGY OF CONTEXT VARIABLES

Given the aforementioned classifications, context variables can be classified according to three dimensions:

1. Process around which it exists and influences. Returning to the general concept of 'context', the question was asked: "context in relation to what?" It is possible, and in this study, necessary, to refer to something the context of which is under scrutiny. In discussing context, it thus helps to discuss it in relation to a process. In this study, the IS organization is conceived as a system of processes, and these processes are: IS management processes, IS DIMO (development, implementation, maintenance, operation) processes, IS use processes, and IS feedback processes. Context variables can thus be described and classified in relation to these processes.
2. The degree of controllability. As illustrated by Ein-Dor and Segev (1978), understanding how controllable the variable is important in assessing the feasibility of a project. A variable can thus be controllable, partially controllable, or uncontrollable.
3. The unit of analysis. As illustrated by Swanson (1983), identifying the unit of analysis in studying a set of variables helps in the analysis. A variable is either analysed or measured at the individual level, the organizational level, or the market level.

These three dimensions can be used to classify variables and identify other variables that may have an effect on ISOS performance.

This classification scheme was applied to the 30 articles selected for this research, which was performed in 1998. These articles were chosen after an extensive search through electronic abstracts was performed, using such key words as: 'performance', 'success', and 'information systems organization'. While large number of articles satisfying this criteria emerged, the more recent articles that empirically investigated performance, context, or IS structure were selected. Most of these were published in top MIS journals as identified by Holsapple *et al*. (1994) using a citation analysis methodology. The studies included in this review investigated some aspect of organizational context and IS performance, using conceptual frameworks built upon previous IS research. Three studies were published in the 1980's while the rest were published in the 1990's, the most recent being 1997. (A listing of these papers with the data on the content analysis is available from the author.)

The context variables in each of the studies were classified by answering the following questions:

- What process (based on the ISOS definition) are the variables hypothesized to affect?
- Are the variables considered controllable, partially controllable, or uncontrollable?
- Is the unit of analysis at the individual, organizational, or market levels?

This classification helps illustrate where the bulk of research lies and identifies other promising areas of research into IS context-performance theory. Due to space constraints, the detailed classification of these studies is not shown here but is available from the author.

Examples of context variables from these studies that were classified as affecting the IS management process are:

- IT organisational structure (Blanton, Watson *et al*., 1992)
- IT management climate (Boynton, Zmud *et al*., 1994)
- IS Planning characteristics (Premkumar and King, 1994)
- Decision-making structure and control structure (Kim and Umanath, 1992)

Examples found of context variables classified as affecting IS development, implementation, maintenance, and operation processes are:

- Software development task content: task complexity and work flow interdependence (Kim and Umanath, 1992)
- Requirements uncertainty (Brown and Bostrom, 1994)
- Individual characteristics: self-esteem, goal difficulty, role ambiguity (Rasch and Tosi, 1992)
- User participation in IS development (Saleem, 1996)

Some context variables investigated with respect to IS Use are:

- Organisational culture (Grote and Baitsch, 1991)
- User resistance (Markus, 1983)
- Computer self-efficacy (Compeau and Higgins, 1995)

The comparative case study of two banks by Blanton, Watson *et al*. (1992) is an example of research classified in the IS Management Process/Controllable/Organisation category. The context variables classified as controllable are: the organisation of IT functions, the IT application planning and development process, IT management controls and operating procedures. These were variables in the context of IS management considered to influence the effectiveness of IT support.

A longitudinal study on the perceived usefulness of information by public managers in the US (Kraemer, Danziger *et al*., 1993) investigated context variables such as individual characteristics and styles of use (including such factors as years of experience with computing, degree of reliance on experts to interpret information). These context variables were classified under the IS Use/Uncontrollable/Individual level.

Similar analysis was performed on each of the 30 studies found. The results of this classification are summarized in a frequency table shown below (Table 2).

As Table 2 shows, most of the variables investigated in the literature reviewed fell into the uncontrollable-organization-IS management category. This means that the context variables in these studies focussed on the context surrounding the IS management process. Most variables were at the organisational unit of analysis, a few on the individual, and none for market levels. No variables were classified as affecting the IS Feedback process.

While these figures would have been affected if more IS research studies were included in the review, the classification scheme shows that there may be context variables other than the ones traditionally researched that may need further study. For example: are there any individual-based context factors that affect IS management? Are there any market-based factors affecting any of the processes? Are there any factors, individual, organizational, or market-based, that affect the IS Feedback process? Answering these questions could contribute to a broadening of the IS context-performance research stream.

		Degree of Controllability		
Process	**Unit of Analysis**	**Controllable**	**Partially Controllable**	**Uncontrollable**
IS Management	Individual	--	--	--
	Organization	**7**	**7**	**11**
	Market	--	--	--
IS DIMO	Individual	--	**1**	**3**

Process	Unit of Analysis	Degree of Controllability		
		Controllable	Partially Controllable	Uncontrollable
	Organization	**3**	**4**	**3**
	Market	--	--	--
	Individual	--	--	**2**
IS Use	Organization	**2**	**1**	**3**
	Market	--	--	--
	Individual	--	--	--
IS Feedback	Organization	--	--	--
	Market	--	--	--

Table 2: Frequency distribution for each context variable type in the literature reviewed

CONCLUSION

This paper proposed a means to classify organisational context variables that can be hypothesized as affecting the performance of the IS organisation. The IS organisation here was conceptualised as a series of processes: IS management, IS Development-Implementation-Maintenance-Operation, IS Use, and IS Feedback. Classifying context variables involved answering the questions: (1) What IS process is the context variable hypothesized to affect? (2) Is the context variable observed at the individual, organisational, or market level? (3) Is the context variable controllable, partially controllable, or uncontrollable? An application of the classification scheme on a set of research articles show that while factors affecting IS Management processes are studied in great detail, the are no factors affecting the IS Feedback process. There is a focus on the organisational level of analysis but not on the individual level. This suggests that research may be broadened if factors affecting IS Feedback, and factors stemming from an individual or from a market level of analysis are investigated further.

REFERENCES

The Australian pocket Oxford dictionary. (1984) 2nd edition, G. Turner (ed.), Oxford University Press, Melbourne.

The concise oxford dictionary. (1975) 5th edition, H. W. Fowler and F. G. Fowler (eds.), Oxford University Press, London.

Argyris, C. (1964) *Integrating the individual and the organization*, Wiley, New York.

Blanton, J. E., H. J. Watson and J. Moody. (1992) "Toward a better understanding of information technology organization: a comparative case study." *MIS Quarterly,* vol. 16, no. 4: 531-555.

Boynton, A. C., G. C. Jacobs and R. W. Zmud. (1992) "Whose responsibility is IT management." *Sloan Management Review,* Summer 1992: 32-38.

Brown, C. V and R. Bostrom (1994). "Organization designs for the management of end-user computing: re-examining the contingencies." *Journal of Management Information Systems*, vol. 10, no. 4: 183-211.

Compeau, D. and C. Higgins. 1995, 'Computer self-efficacy: development of a measure and initial test.' MIS Quarterly, vol. 19, no. 2: 189-211.

Delone, W. H. (1981) "Determinants of success for computer usage in small business." *MIS Quarterly,* vol. 5, no. 4: 65-77.

DeLone, W. H. and E. R. McLean. 1992, 'Information systems success: the quest for the dependent variable.' Information Systems Research, vol. 3, no. 1: 60-95.

Ein-Dor, P. and E. Segev. (1978) "Organizational context and the success of management information systems." *Management Science,* vol. 24, no. 10: 1064-1077.

Fiedler, K. D., V. Grover and J. T. Teng. (1996) “An empirically derived taxonomy of information technology structure and its relationship to organizational structure.” *Journal of Management Information Systems,* vol. 13, no. 1: 9-34.

Ford, J. D. and J. W. Slocum. (1977) “Size, technology, environment, and the structure of organizations.” *Academy of Management Review,* vol. 2, no. 4: 561-575.

Grote, G. and C. Baitsch. 1991, ‘Reciprocal effects between organizational culture and the implementation of an office communication system: a case study.’ Behavior & Information Technology, vol. 10, no. 3: 207-218.

Holsapple, C. W., L. E. Johnson, H. Manakyan and J. Tanner. (1994) “Business computing research journal: a normalized citation analysis.” *Journal of Management Information Systems,* vol. 11, no. 1: 131-140.

Iivari, J. (1992) “The organizational fit of information systems.” Journal of Information Systems, vol. 2, no. 2: 3-29.

Jayasuriya, R. (1999) “Managing information systems for health services in a developing country: a case study using a contextualist framework.” *International Journal of Information Management,* vol. 19, no. 5: 335-349.

Kast, F. E. and J. E. Rosenzweig. (1973, *Contingency views of organization and management,* Fourth edition, Science Research Associates, Inc., Palo Alto, CA.

Kast, F. E. and J. E. Rosenzweig. (1985, *Organization and management*: *a systems and contingency approach,* Fourth edition, McGraw-Hill, New York.

Kim, K. K. and N. S. Umanath. (1992) “Structure and perceived effectiveness of software development subunits: a task contingency approach.” *Journal of Management Information Systems,* vol. 9, no. 3: 157-181.

Kraemer, K. L., J. N. Danziger, D. E. Dunkle and J. L. King. (1993) “The usefulness of computer-based information to public managers.” *MIS Quarterly,* vol. 17, no. 2: 129-148.

Markus, M. L. 1983, ‘Power, politics, and MIS implementation.’ Communications of the ACM, vol. 26, no. 6: 430-444.

Mason, R. O. and I. Mitroff. (1973) “A program for research on management information systems.” Management Science, vol. (19, no. 5: 475-487.

Miller, C., W. Glick, Y.-d. Wang and G. Huber. (1991) “Understanding technology-structure relationships: theory development and meta-analytic theory testing.” *Academy of Management Journal,* vol. 34, no. 2: 370-399.

Premkumar, G. and W. King. (1994) “Organizational characteristics and information systems planning: an empirical study.” *Information Systems Research,* vol. 5, no. 2: 75-109.

Rasch, R. H. and H. L. Tosi. (1992) “Factors affecting software developers” performance: an integrated approach.” *MIS Quarterly,* vol. 16, no. 3: 395-413.

Raymond, L., G. Pare and F. Bergeron. (1995) “Matching information technology and organizational structure: and empirical study with implications for performance.” *European Journal of Information Systems,* vol. 4, no. 1: 3-16.

Saleem, N. (1996) “An empirical test of the contingency approach to user participation in information systems development.” *Journal of Management Information Systems,* vol. 13, no. 1: 145-166.

Swanson, E. B. (1987) “Information systems in organization theory: a review” *Critical issues in information systems research*. R. J. Boland Jr and R. A. Hirschheim (ed).John Wiley & Sons Ltd., Chichester.

Weill, P. and M. Olson. (1989) “An assessment of the contingency theory of management information systems.” *Journal of Management Information Systems,* vol. 6, no. 1: 59-85.

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