The Effects of Task, Organization and Accounting Information Systems Characteristics on the Accounting Information Systems Performance in Tehran Stock Exchange

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***Abstract*—Accounting information systems (AIS) as a part of company's information systems (IS) are seen as facilitating decision making within organizations and should be tailored to an organization's environment, requirements of task, and structure. This consideration makes systems fit to task characteristics and organizational structure. Therefore, this study examines the effects of task uncertainty, decentralization and accounting information systems characteristics on the accounting information systems performance. Accounting information systems characteristics are defined in terms of the availability of those characteristics and user satisfaction is a surrogate measure that is applied for measuring the performance of accounting information system. The responses of 60 financial managers drown from a cross section of Tehran stock exchange (TSE), to a questionnaire survey were analyzed by examining the regression equation for one tailed model at the subunit level. The results show that: broad scope and aggregated information promote user satisfaction in high task uncertainty and decentralized situations. But, timeliness information promotes user satisfaction only in high task variability situations. Also the moderating effects of contingent variables were non monotonic.**

***Index Terms*—Accounting information system performance, decentralization, uncertainty, user satisfaction.**

I. Introduction

A critical research issue in the field of accounting information system (AIS) design, concerns the consideration of contextual variables and hence, for a more successful design, contingency relationships between contextual variables and characteristics of the AIS should be examined [2]. These suggest that there must be an appropriate fit between contextual variables (e. g. environment, task and structure) and AIS information characteristics to enhance managerial performance [20]. AIS is defined here as a computer based system that processes financial information and supports decision task in the context of coordination and control of organizational activities [2]. Barney [10] suggests that effective information processing helps information flow more smoothly to decision makers, who can make more informed decisions more quickly, thereby giving the organization a substantial competitive advantage. However, Galbraith [13] warns that information overload can be resulted from even the most effective systems. This is why many studies stress the importance of the fit between task and technology [6]. Matching information technology with business tasks and user needs can significantly upgrade managerial performance and user satisfaction [4]. We believe that AIS plays a major role in providing decision makers with appropriate information concerning management, auditing, and control functionality. Consistent with the literature and our presumptions about the decision making importance of AIS, we decided to examine the fit between the type of information provided by AIS and the level of task uncertainty and decentralization

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II. Literature and Theoretical Background

A. The Information Characteristics and Performance of AIS

In the Chenhall and Morris [21] study, the accounting information systems were considered in terms of perceived usefulness of the AIS information characteristics of scope, aggregation, timeliness and integration. To link perceived usefulness of AIS characteristics to performance, however, is unrealistic since it is the availability of these individual information characteristics of AIS that could have an impact on performance. Managers could perceive some characteristics of AIS to be useful but that characteristics may not be available in the AIS. Since it may be impractical to incorporate all these, we embarked on this study to uncover the most important ones as scope, timeliness and aggregation. Therefore in this study we decided to examine the fit between characteristics of AIS (scope, timeliness and aggregation) and contingent variables (task uncertainty and decentralization) that promote performance of AIS. We chose AIS performance, because it seemed the most logical link toward promoting organizational effectiveness. Apparently it is difficult to assess the contribution of information system to performance in a real world situation: a large portion of the costs and benefits will be qualitative or intangible. The assessment of the value of unstructured or ad hoc decision making may be nearly impossible and organizations typically will not record these costs and benefits. Therefore, two alternative success measures gained acceptance: usage of system and user satisfaction (US). Rationale for the application of usage of system as an IS success measure is the idea that it does not contribute to performance if it is not used (and will contribute to performance when it is). An alternative rationale states that

users are able to assess the value of the IS and will use it if they conclude that the benefits (rewards) will outweigh the costs (efforts). Both rationales assume that more usage of system is better, which is not necessarily the case. Furthermore, application of usage as a success measure may suffer from the fact that a system will be used if managers feel that it facilitates their own goals. On another level, it is unclear what exactly the amount usage of an IS is. Also, subjective measurement of usage of system may be influenced by social desirability. Finally, the application of a dichotomous usage measure, suffers from the lacks sufficient sensitivity; it will only identify systems that are not used at all and not differentiate between systems that are used. Whereas usage of system indirectly assesses the users' judgment of AIS success, US directly assesses how well the IS meets the requirements. This approach is conceptually similar to the assessment of user evaluations of task technology fit (TTF) [16]. Therefore we concentrated on user satisfaction as a measure.

B. Task Uncertainty and Performance of AIS

The contextual variables may be broadly classified into two groups: individual and organizational level variables. On the organizational level, key contextual variables are environment, structure and technology or task. The environment, measured by perceived uncertainty, is an external variable to the organization. It is a macro variable. Contextual variables in the research model must be consistent with the unit of analysis. At a subunit level, task uncertainty should be considered [11]. In this study, the unit of analysis is the subunit. Thus task uncertainty is included as important contextual variable. Galbraith [13] suggests that task uncertainty can be defined as the difference between the amount of information needed to complete a task and the amount of information already possessed. Perrow [3] proposes two basic dimensions of task uncertainty: analyzability (i.e. task difficulty) and number of exceptions (i.e. task variability) that occur when operating a task. Difficulty refers to a continuum of search behavior centered on an understanding of cause and effect relationships. Variability describes the frequency of novel and unexpected events that occur when operating a task [14]. Accordingly, more task variety and more task difficulty amount, lead to higher task uncertainty and better information is needed for effective performance [17]. Recent managerial accounting studies [18]-[14] found task difficulty, in particular, to be an important moderating variable in a budget participation and performance setting. Task variability and task difficulty are two independent functions, each with different consequences operating at the work unit level. Hence, there is reason to examine the separate effects of task variability and task difficulty on the path model in Figure 1. We will refer to analyzability as task difficulty and number of exceptions as task variability throughout the paper. Specht [19] indicated that when the task variability is high, broad scope information is needed to cover various exceptional events, and the need for manipulated information (this includes analyzed or aggregated data (means, ranges, etc.) and decision aids (e.g. graphics)) may also increase to reduce the time required to make a decision. Chong [22] also showed that in a high task uncertainty situation the extent of use of broad scope information led to effective managerial decisions and hence to improved managerial performance. Therefore, information users may have to process and receive more broad scope, timely, and aggregated information to deal with higher variable tasks. Chang, Chang and paper [20] report that broad scope information; enhance the AIS performance under high task variability situation. Also when the task difficulty is high, the task is not well understood, and there are no objective and correct procedures or rules to follow. Therefore, in high task non analyzability situations, users need broad scope and timely information to facilitate their decision making. Second, cause and effect relationships are not well understood under high task non analyzability and multiple focuses or aggregated information may be needed. Because aggregated information is less specific, it may be more helpful when searching for multiple answers or solutions [20].

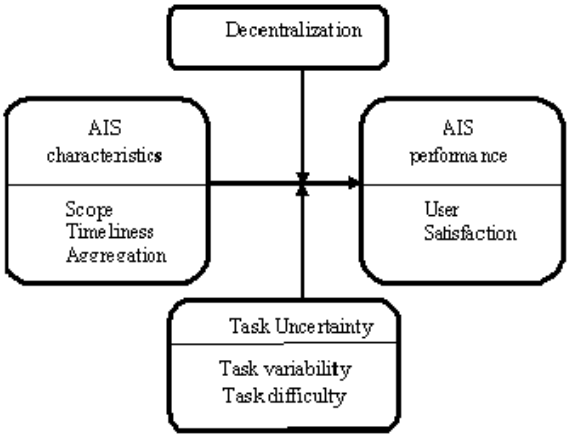

Fig. 1. Magnetization as a function of applied field.

C. Decentralization and Performance of AIS

The organizational structure dimensions, whose are related to information processing capabilities, are formalization and centralization [11]. In this study, organizational structure is discussed in terms of decentralization; because of its theoretical relationship to perceived uncertainty [21]. Decentralization refers to the level of autonomy delegated to the managers [5]. More specifically, decentralization is seen as an important contingent variable in designing AIS, and it is a supportive mechanism which should be consistent with the intent of the formal structure arrangements [21]. The contingency view of AIS design proposes that AIS should suit the extent of decentralization within the firm. Under highly decentralized organizations, managers tend to require aggregated information to control and coordinate the activities of interdependent subunits. Broad scope information is also needed to serve the diversity of decisions faced by the decentralized manager [20]. Chenhall and Morris [21] indicate that aggregated and integrated information is perceived favorably by decentralized managers, who should put emphasis on the coordination of the subunits given highly decentralized organizational environments. Gul and Chia [7] suggest that AIS provide broad scope and aggregated information, improves

managerial performance under high environmental uncertainty and decentralization. Choe [11] reports that broad scope, timely, and aggregated information with high user participation in the design of AIS has a positive influence on the performance in a highly decentralized organization. Chang, Chang and paper [20] report that broad scope, timeliness and aggregated information; enhance the AIS performance under highly decentralized organizations.

III. Hypotheses

In sum, the literature suggests that performance is linked to a fit between contextual variables and the characteristics of AIS. According to contingency theory, the organization's information processing capacity should match the business requirements of the organization to improve managerial performance. The first question we examined was whether the fit between task uncertainty and characteristics of AIS can really enhance the performance of AIS.

Hypotheses 1 and 4: AIS that provide broad scope information will have a positive impact on US in highly task variability / task difficulty situations.

Hypotheses 2 and 5: AIS that provide timely information will have a positive impact on US in highly task variability / task difficulty situations.

Hypotheses 3 and 6: AIS that provide aggregated information will have a positive impact on US in highly task variability / task difficulty situations.

Consistent with the literature, we posit that broad scope, timeliness and aggregated information provided by AIS aids the coordination of subunits and improves user satisfaction in highly decentralized organizations. Then:

Hypotheses 7 and 9: AIS that provide broad scope / timely / aggregated information will have a positive impact on US in highly decentralized situations.

IV. Methodology

A. The Instrument and Sampling Procedure

The survey instrument consisted of a 49 item questionnaire was mailed to financial managers of 100 randomly selected companies in Tehran stock exchange (TSE) with the exception of investment companies, banks and financial institutions (2009). We used 20 responses to pre validate the instrument. The pilot test results indicated that the instrument contained no ambiguities. Finally sixty companies returned usable questionnaires (60% response rate). It is while that, sample size on the basis of Cochran formula was 58 items. Therefore the efficiency of sample size is supported.

B. Measurements

Task Uncertainty: Task uncertainty (task variability and task difficulty) was measured using the eight items composite scale developed by Van de Ven and Delbecq [1].

AIS characteristics: Accounting information system is defined in terms of the availability of the information characteristics or attributes of scope, timeliness and aggregation. Scope, refers to the dimensions of focus, quantification, and time horizon. Broad scope information includes external, nonfinancial and future oriented material. Timeliness is usually specified in terms of the ability to provide information on request and the frequency of reporting systematically collected information. Aggregation of information provides summarized information that covers periods of time or diverse management areas [11]-[20]. The items used to measure AIS characteristics were obtained from Chenhall and Morris [21] and Choe [11].

Decentralization: The items used to measure decentralization were obtained from Aiken and Hage [15].

AIS performance: User satisfaction is a difficult, intangible and elusive concept to define: "ultimately a state experienced inside the user's head" [9]. "Affective attitude towards an specific computer application by someone who interacts with the application directly" [23].

Task technology fit (TTF) instrument was, appropriate for measuring the impact of environmental uncertainty on task characteristics and on user satisfaction. The instrument is developed, used and subsequently modified by Goodhue [4]. The measurement of research variables is shown in table I.

TABLE I: Measurements of Research Variables

Variables	Measurement
Task uncertainty	8 question items, five point Likert type scale
AIS characteristics	9 question items, five point Likert type scale
Decentralization	5 question items, five point Likert type scale
User satisfaction	27 question items, five point Likert type scale

C. Research Model

This study is a kind of descriptive and correlation analysis. In this regard and for the purpose of testing hypotheses, we used the following original multiple regression model to test hypotheses:

$$y = \beta_0 + \beta_1 Z_1 + \beta_2 X_1 + \beta_3 Z_1 X_1 + \varepsilon. \quad (1)$$

γ = user satisfaction (dependent variable), χI = AIS characteristics ($\chi 1$ = broad scope, $\chi 2$ = timeliness, $\chi 3$ = aggregation), ZI = contingency variables (Z1 = task variability, Z2 = task difficulty, Z3 = decentralization), χIZI = the interaction of AIS characteristics and contingency variables. Then to obtain additional insight of the nature and direction of the interaction effects of information characteristics, we computed the partial derivative of Eq. (1) over the extent of information scope, timeliness and aggregation. It is expected that to get non monotonic results of the variables in the contingency research [20].

D. Data Analysis

This research includes nine hypotheses that were tested by t student method. The tests were done with 95% confidence level and with n – 2 degree of freedom for one tailed model at the subunit level. The coefficient of interaction term ($Z_I\chi_I$) needs to be a positive value ($\beta_3 > 0$) to be significant to support hypotheses.

V. Results

A. Reliability and Validity Test

Table II presents means, standard deviations, response

ranges and Cronbach alpha for the variables. The alpha reliability coefficients for the five multiple item scales are above the commonly applied standard of 0.70 [12], suggesting reasonable item convergence. We also used factor analysis to test the construct validity, and the factor loadings were all above the value of 0.5 suggested by Kerlinger [8].

TABLE II: DESCRIPTIVE STATISTICS OF RESEARCH VARIABLES AND RELIABILITY ANALYSIS

Variables	Mean	Standard deviation	Theoretical range	Cronbach alpha
User satisfaction	3.64	0.43	1-5	0.93
Task variability	3.38	0.43	1-5	0.83
Task difficulty	3.60	0.40	1-5	0.83
Decentralization	2.98	0.55	1-5	0.72
Scope	2.44	0.47	1-5	0.77
Timeliness	3.67	0.67	1-5	0.75
Aggregation	3.89	0.49	1-5	0.75

B. The Interaction between Task Uncertainty and Characteristics of AIS

Hypotheses 1 – 3 test the impact of task variability and AIS characteristics (taken together) on performance. We used the following regression model as a basis for examining these interactions:

$$y = \beta_0 + \beta_1 Z_1 + \beta_2 X_1 + \beta_3 Z_1 X_1 . \quad (2)$$

Task variability and broad scope information: This research includes nine hypotheses that were tested by t student method. The tests were done with 95% confidence level and with n – 2 degree of freedom for one tailed model at the subunit level. The coefficient of interaction term ($Z_i\chi_I$) needs to be a positive value ($\beta_3 > 0$) to be significant to support hypotheses.

$$y = -0.57\, Z_1 - 0.21\, X_1 + 0.12\, Z_1 X_1 . \quad (3)$$

$$\Delta y / \Delta X_1 = -0.21 + 0.12\, Z_1 . \quad (4)$$

Equation (4) will be zero when Z_1 (task variability) has a value of 1.75 (this is the inflection point). This shows that the moderating effect of task variability is non monotonic. It means that the broad scope information provided by AIS enhance user satisfaction under high task variability however, AIS that provide narrow scope information improve user satisfaction under low task variability

TABLE III: THE RESULTS OF HYPOTHESIS 1

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Task variability	– 0.57	0.16	– 3.52	0.00	1.77
Broad scope	– 0.21	0.20	– 1.05	0.30	2.74
Interaction	0.12	0.05	2.24	0.03	2.83
R^2 = 0:22; adj. R^2 = 0:18; $F_{3;55}$ = 2.76; P – value = 0.003.					

Task variability and timely information: As can be seen from Table IV, β_3 = 0.09 and ρ – value = 0.01. Thus, hypothesis 2 is supported:

$$y = -0.51\, Z_1 - 0.03\, X_2 + 0.09\, Z_1 X_2 . \quad (5)$$

$$\Delta y / \Delta X_2 = -0.03 + 0.09\, Z_1 . \quad (6)$$

Equation (6) will be zero when Z_1 has a value of 0.33 (this is the inflection point). This shows that the moderating effect of task variability is non monotonic. It means that the timely information provided by AIS enhance user satisfaction under high task variability. On the contrary, AIS that provide periodic information improve user satisfaction under low task variability.

TABLE IV: THE RESULTS OF HYPOTHESIS 2

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Task variability	– 0.51	0.14	– 3.59	0.00	1.67
Timeliness	– 0.03	0.13	– 0.23	0.82	3.44
Interaction	0.09	0.04	2.56	0.01	3.47
R^2 = 0:35; adj. R^2 = 0:32; $F_{3;55}$ = 2.76; P – value = 0.00.					

Task variability and aggregated information: As can be seen from Table 5, β_3 = 0.11 and ρ – value = 0.03. Thus, hypothesis 3 is supported:

$$y = -0.63\, Z_1 - 0.09\, X_3 + 0.11\, Z_1 X_3 . \quad (7)$$

$$\Delta y / \Delta X_3 = -0.09 + 0.11\, Z_1 . \quad (8)$$

Equation. (8) will be zero when Z_1 has a value of 0.82. This shows that the moderating effect of task variability is non monotonic. It means that the aggregated information provided by AIS enhance user satisfaction under high task variability however, disaggregated information improve user satisfaction under low task variability.

TABLE V: THE RESULTS OF HYPOTHESIS 3

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Task variability	– 0.63	0.19	– 3.20	0.00	2.5
Aggregation	– 0.09	0.17	– 0.55	0.58	2.02
Interaction	0.11	0.05	2.22	0.03	3.09
R^2 = 0:20; adj. R^2 = 0:16; $F_{3;54}$ = 2.76; P-value = 0.007.					

Hypotheses 4 – 6 test the impact of task difficulty and AIS characteristics (taken together) on performance. We used the following regression model as a basis for examining these interactions:

$$y = \beta_0 + \beta_1 Z_2 + \beta_2 X_1 + \beta_3 Z_2 X_1 . \quad (9)$$

Task difficulty and broad scope information: As can be seen from Table 6, β_3 = 0.39 and ρ – value = 0.03. Thus, hypothesis 4 is supported:

$$y = -0.83\, Z_2 - 1.24\, X_1 + 0.39\, Z_2 X_1 . \quad (10)$$

$$\Delta y / \Delta X_1 = -1.24 + 0.39\, Z_2 . \quad (11)$$

Equation (11) will be zero when Z_2 (task difficulty) has a value of 3.18. This shows that the moderating effect of task difficulty is non monotonic.

TABLE VI: THE RESULTS OF HYPOTHESIS 4

Variables	β – Value	Standard Error	τ– Value	ρ –Value	VIF
Task difficulty	– 0.83	0.45	– 1.86	0.07	1.02
Scope	– 1.24	0.64	– 1.93	0.06	1.14
Interaction	0.39	0.17	2.25	0.03	1.15
$R^2 = 0.1$; adj. $R^2 = 0.05$; $F_{3; 55} = 2.76$; P-value = 0.04.					

Task difficulty and timely information: As can be seen from Table 7, $\beta_3 = -0.02$ thus hypothesis 5 is not significant.

TABLE VII: RESULTS OF HYPOTHESIS 5

Variables	β – Value	Standard Error	τ– Value	ρ –Value	VIF
Task difficulty	0.28	0.15	1.88	0.07	1.6
Timeliness	0.35	0.11	3.29	0.00	2.23
Interaction	– 0.02	0.03	– 0.7	0.49	2.65
$R^2 = 0.26$; adj. $R^2 = 0.22$; $F_{3; 55} = 2.76$; P – value = 0.001.					

Task difficulty and aggregatede information: As can be seen from Table 8, $\beta_3 = 0.14$ and ρ – value = 0.00. Thus, hypothesis 6 is supported:

$$y = -0.35 Z_2 - 0.48 X_3 + 0.14 Z_2 X_3. \quad (12)$$

$$\Delta y / \Delta X_3 = -0.48 + 0.14 Z_2. \quad (13)$$

Equation (13) will be zero when Z2 has a value of 3.43. This shows that the moderating effect of task difficulty is non monotonic. It means that the aggregated information provided by AIS enhance user satisfaction under high task difficulty. On the contrary, disaggregated information improve user satisfaction under low task difficulty.

TABLE VIII: THE RESULTS OF HYPOTHESIS 6

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Task difficulty	– 0.35	0.19	– 1.89	0.06	2.46
Aggregation	– 0.48	0.14	– 3.31	0.00	1.96
Interaction	0.14	0.04	3.73	0.00	3.64
$R^2 = 0.24$; adj. $R^2 = 0.19$; $F_{3; 55} = 2.76$; P – value = 0.002.					

The interaction between decentralization and characteristics of AIS: Hypotheses 7 – 9 test the impact of decentralization and AIS characteristics (taken together) on performance. We used the following regression model as a basis for examining these interactions:

$$y = \beta_0 + \beta_1 Z_3 + \beta_2 X_1 + \beta_3 Z_3 X_1. \quad (14)$$

Decentralization and broad scope information: As can be seen from Table 9, $\beta_3 = 0.14$ and ρ – value = 0.02. Thus, hypothesis 7 is supported:

$$y = -0.56 Z_3 - 0.15 X_1 + 0.14 Z_3 X_1. \quad (15)$$

$$\Delta y / \Delta X_1 = -0.15 + 0.14 Z_3. \quad (16)$$

Equation (16) will be zero when Z_3 has a value of 1.07. This shows that the moderating effect of decentralization is non monotonic. It means that the broad scope information provided by AIS enhance user satisfaction under highly decentralized situations. However, narrow scope information improve user satisfaction under low decentralization.

TABLE IX: THE RESULTS OF HYPOTHESIS 7

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Decentralization	– 0.56	0.16	– 3.46	0.00	3.05
Scope	– 0.15	0.20	– 0.77	0.45	2.8
Interaction	0.14	0.06	2.35	0.02	4.80
$R^2 = 0.23$; adj. $R^2 = 0.18$; $F_{3; 56} = 2.76$; P – value = 0.002.					

Decentralization and timely information: As can be seen from Table 10, $\beta_3 = 0.04$ and ρ – value = 0.23. Thus, hypothesis 8 is not supported.

TABLE X: THE RESULTS OF HYPOTHESIS 8

Variables	β – Value	Standard Error	τ– Value	ρ – Value	VIF
Decentralization	– 0.23	0.09	– 2.36	0.02	1.18
Timeliness	0.17	0.09	1.70	0.09	1.76
Interaction	0.04	0.03	1.22	0.23	1.73
$R^2 = 0.26$; adj. $R^2 = 0.22$; $F_{3; 56} = 2.76$; P-value = 0.001.					

Decentralization and aggregated information: As can be seen from Table 11, $\beta_3 = 0.14$ and ρ – value = 0.03. Thus, hypothesis 9 is supported:

$$y = -0.81 Z_3 - 0.54 X_3 + 0.14 Z_3 X_3. \quad (17)$$

$$\Delta y / \Delta X_3 = -0.54 + 0.14 Z_3. \quad (18)$$

Equation (18) will be zero when Z_3 has a value of 3.86 (this is the inflection point). This shows that the moderating effect of decentralization is non monotonic. It means that the aggregated information provided by AIS enhance user satisfaction under highly decentralized situations. On the contrary, AIS that provides disaggregated information improve user satisfaction under low decentralization.

TABLE XI: THE RESULTS OF HYPOTHESIS 9

Variables	β – Value	Standard Error	τ – Value	ρ – Value	VIF
Decentralization	– 0.81	0.3	– 2.74	0.01	3.25
Aggregation	– 0.54	0.26	– 2.09	0.04	1.03
Interaction	0.14	0.06	2.26	0.03	3.21
$R^2 = 0.13$; adj. $R^2 = 0.09$; $F_{3; 55} = 2.76$; P – value = 0.049.					

VI. Discussion

This study examined two main effects: whether task uncertainty and decentralization interacting with information characteristics had a positive effect on the AIS performance. The results show that variable and difficult tasks when supplemented with broad scope, timely and aggregated information can improve performance. In contrast, narrow scope, periodic and disaggregated information promotes user satisfaction in low task uncertainty. This shows that, consistent with the expectations moderating effects of task uncertainty in non monotonic. The results which supported hypotheses 1, 2, 3, 4 and 6, were consistent with the notion that more task variety and more task difficulty amount, lead to higher task uncertainty. Highly complex and non routine tasks require more and better information for effective performance [17]. This explanation is similar to that of Gul and Chia [7], Choe [11], Chong [22], Chang, Chang and paper [20] and Specht [19].

The results which supported hypothesize 7 and 9 were consistent with the notion that When decentralization is high, managers will also require more information and AIS which provides more sophisticated information in terms of scope and aggregation will enhance the decisions of the managers, hence contributing to higher performance. In contrast, narrow scope and disaggregated information promote user satisfaction in low decentralized situations. This shows that the moderating effects of decentralization is non monotonic. This explanation is similar to that of Gul and Chia [7] and Chang, Chang and paper [20]. The results also showed that timely information has no significant role in decision making in Tehran stock exchange.

VII. Limitations

In evaluating this study, several limitations should be noted. As with more empirical studies in this type, generalizing the results to other settings needs to be viewed with caution. However, this limitation is mitigated because the population consisted of companies operating under varying task uncertainty situations and which would most likely use a range of sophisticated AIS and has varying decentralized structures. Generalizability of the results was also limited by the sample size. The variables included in the present study represented only a small subset of the variables which might be significant to the performance of an organization and its members.

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