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# AN ANALYSIS OF THE RELATIONSHIPS AMONG INFORMATION SCOPE, ORGANIZATIONAL PROACTIVENESS, AND FIRM PERFORMANCE

Arthur H. Gilbert, Jr., University of West Florida  
Randall C. Reid, University of West Florida

## ABSTRACT

*The widespread use of information technology no longer automatically conveys a competitive advantage to the users of such technology. Instead, the emphasis should be placed on the creative use of the information obtained through the technology rather than on the technology itself. One way to accomplish is to align the information systems design with the strategy that the organization is pursuing. Scope is an important characteristic of the information obtained through information systems while proactiveness is an important element of strategy. Although the relationship between these variables has been addressed from a conceptual perspective, this relationship has not been subjected to rigorous empirical analysis. This research examines these relationships based on a sampling of chief executive officers. The results suggest that the coalignment of information scope and organizational proactiveness has a significant and positive impact on firm performance.*

## INTRODUCTION

According to Carr (2003), the use of information systems has become so widespread that an investment in information technology does not necessarily guarantee a competitive advantage any longer. The important issue is to concentrate on the creative use of the information obtained from a system rather than the technology used to create, transmit and present the information (Dearstyne, 2004).

The above argument supports the proposition that organizations are more effective when their structural mechanisms and strategies are aligned or congruent (Chandler, 1962). Information scope is an important element in the design of information systems (a structural mechanism) while proactiveness is an important element of strategy. While previous research has addressed these constructs from a conceptual perspective, the relationships between these two constructs, particularly their congruence, have not been rigorously analyzed in an empirical manner.

The purpose of this research is to examine the relationships among information scope, organizational proactiveness, and their associated impact on firm performance.

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## REVIEW OF THE LITERATURE

### Information Scope

The scope of an information system is concerned with the characteristics of focus, quantification, and the time horizon of the information provided by the system (Chenhall and Morris, 1986). A traditional information system provides information which is focused on internal organizational events, stated in monetary terms, and based on historical data. In addition to the information provided by a traditional system, a broad scope information system provides managers with economic and noneconomic information concerning the external environment. A broad scope information system also provides measurements stated in non-monetary units as well as information which can be used in predicting the consequences of future events (Gordon and Miller, 1976).

Linn *et al* (2001) found that broad scope managerial accounting information does not moderate the impact of budget emphasis, budget participation and the perceived environmental uncertainty on the propensity to create budget slack. Sharma *et al* (2006) found that broad scope management information systems interact with individual managerial control mechanisms in both the decision facilitation and decision influencing roles of management.

Some of the previous research addresses information scope and organizational performance in a contingency framework, as does this study. Gul (1991) found that a sophisticated management accounting information system providing broad scope information had a positive effect on performance under high levels of uncertainty, but it had a negative effect on performance under low levels of uncertainty. Chong and Chong (1997) proposed that broad scope information is an important antecedent of organizational performance. Naranjo-Gil (2004) reported an indirect effect of sophisticated accounting information systems on performance acting through a Prospector strategy in a sample of Spanish hospitals. Ismail and King (2006) found that firms that aligned their information processing capacity with their perceived information requirements, including scope, exhibited higher levels of performance than those firms that did not.

### Organizational Proactiveness

Proactiveness has long been identified as an important element in strategy research. Miles and Snow (1978), Porter (1980), and Venkatraman (1989) addressed its role in their respective typologies.

The success of the Prospector strategic type in the Miles and Snow framework (1978) is dependent on finding and exploiting new product and market opportunities before the competition discovers them. To accomplish this, the Prospector must conduct broad, continuous environmental scanning in order to quickly identify these opportunities. This requires the Prospector to invest in mechanisms which allow it to monitor a wide range of environmental conditions, trends, and events (Miles and Snow, 1978).

At the other end of the strategic continuum, the Defender is concerned with protecting its limited, narrow domain. It tends to ignore developments outside this domain. Generally, the outside environment is viewed as a conglomeration of a relatively few important factors whose behavior can be accurately predicted and are not expected to dramatically influence the internal operations of the firm. Firms pursuing this type of strategy require information with an internal focus in order to maximize the efficiency of their operations (Miles and Snow, 1978).

Porter's (1980) differentiation strategy also recognizes the importance of proactiveness. Organizations following this strategy attempt to create products/services superior in quality, efficiency, design innovations, or style before the competition. As does the Prospector, a firm following a differentiation strategy must constantly scan the environment in order to quickly identify changes in consumers' tastes and the actions of competitors (Porter, 1980).

Like the Defender, Porter's (1980) overall cost leadership strategy requires an inward focus. Emphasis is placed on the efficient production of the goods and services. Little attention is paid to the outside environment.

Venkatraman (1989) viewed the proactiveness dimension of strategy as being characterized by early participation in emerging industries, continually searching for market opportunities, and experimenting with potential actions in response to changing trends. This behavior is also indicated by the introduction of new products ahead of the competition. Conversely, proactive behavior is also evidenced by the timely elimination of operations which are in the mature or declining phases of their life cycles.

The relationship between proactiveness and performance remains a source of research interest. In a recent study, Coulthard (2007) found a positive correlation between firm performance and proactiveness.

### **Information Scope, Organizational Proactiveness, and Environmental Uncertainty**

An examination of previous research suggests a relationship between environmental uncertainty and information systems design, including the characteristics of the information obtained from the system. Gordon and Narayanan (1984) found that the primary driver of decisions concerning the characteristics of information required from information systems was management's perception of environmental uncertainty. They suggest that managers operating in more uncertain environments feel a greater need for external, non-financial, and future-oriented information. Managers facing less uncertainty in the operating environment favor internally generated, financial information with a deterministic or historical perspective.

Gul and Chia (1994) reported that the availability of management accounting system information with broad scope characteristics was associated with higher managerial performance under conditions of high perceived environmental uncertainty. Under low environmental uncertainty, the availability of broad scope information was associated with lower performance. Chong and Chong (1997) found that perceived environmental uncertainty is an important antecedent of management information system design, including the scope of information provided.

Abernethy and Guthrie (1994) found that broad scope systems were more effective in firms concerned with continuous market development and innovation. Firms which were less innovative and more interested in protecting an existing, stable product or market were less effective when using broad scope systems. It can be argued that the firms involved in continuous product development/innovation perceive their environmental uncertainty as high and require broad scope information to be effective. Likewise, those firms which are less innovative consider their environments to be more benign and their information requirements successfully met through a traditional information system.

Previous research also reveals relationships between environmental uncertainty and strategic orientation. Several authors (Chandler, 1962; Simons, 1987 and Govindarajan, 1984) have suggested that firms pursuing a Prospector type of strategy perceive environmental uncertainty as high. Firms pursuing a

Defender type of strategy are associated with relatively low levels of environmental uncertainty (Miles and Snow, 1978; Miller, 1988).

### **Information Scope, Organizational Proactiveness, and Firm Performance**

If management is pursuing a highly proactive strategy, it will be continuously scanning the marketplace for new opportunities. It will also be constantly seeking to determine the future actions of competitors in order to undertake preemptive measures. Gordon and Miller (1976) posited that to promote proactive decision-making, the effective information system must provide information on the activities of competitors and long range forecasts of product demand and costs. Broad scope information is needed to fulfill these requirements. Information lacking in breadth of scope will not meet management's requirements for pursuing the proactive strategy. However, if a less proactive strategy is being followed, management does not require such broad scope information. In fact, broad scope information will be detrimental to effective decision making. According to Day and Schoemaker (2005), companies operating in relatively stable environments requiring a less proactive strategy will waste resources reacting to signals coming from a broad scope information system. Managers operating in this environment will also be faced with information overload if a system providing broad scope is employed. Tushman and Nadler (1978) indicated that information overload is dysfunctional and an impediment to organizational performance.

### **RESEARCH HYPOTHESES**

The research cited above provides a contingency framework within which to specify the characteristics of the information to be obtained through an organization's information system in order to have a positive impact on organizational performance. The basic tenet of this study is that the scope of the information provided by the information system must be congruent with the degree of proactiveness of the organization. Furthermore, it is proposed that the degree to which this congruence exists has a significant and positive effect on firm performance.

Congruence can be measured in a number of ways. Venkatraman (1990) identified three perspectives from which the concept of fit or congruence can be approached: (1) the interactionist perspective, (2) the profile deviation perspective, and (3) the covariation perspective.

The interactionist perspective has long been a popular technique for analyzing congruence. Schoonhoven (1981, 351) stated "... when contingency theorists assert that there is a relationship between two variables ... which predicts a third variable ... they are stating that an interaction exists between the first two variables."

The profile deviation perspective views congruence in terms of the adherence to an externally specified profile. The logic underlying this perspective is that an ideal profile can be defined in terms of the variables of interest and that the degree to which the organization adheres to this profile will be positively related to performance (Venkatraman, 1990).

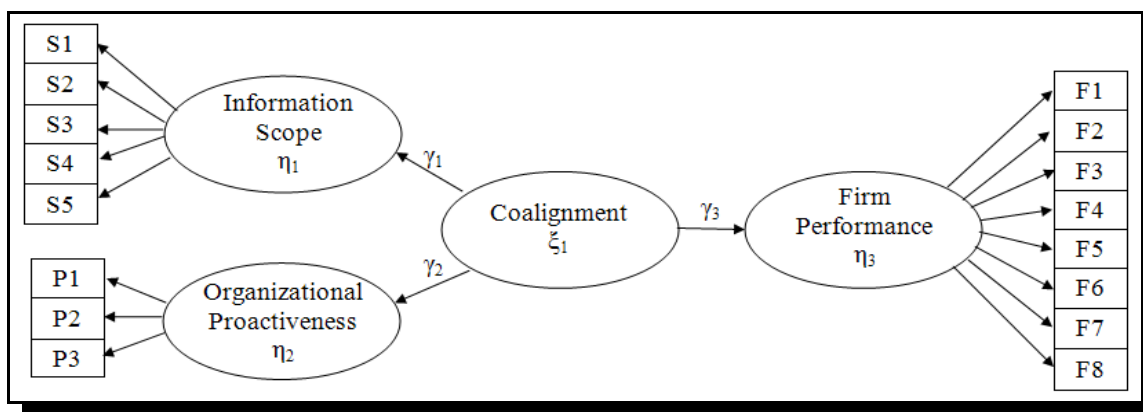
According to Venkatraman (1990), the concept of strategic fit under the covariation perspective is termed coalignment. He states "... specification of the coalignment in terms of covariation requires explication of the underlying linkages among dimensions" (Venkatraman, 1990, 24). This view of coalignment is the perspective of fit or congruence which is used in this study.

The assessment of coalignment was performed through the application of a second-order factor analysis as described by Venkatraman (1990). This is shown graphically in Figure 1. The assessment of the coalignment of information scope and organizational proactiveness positively affecting firm performance requires testing of two related hypotheses. Both hypotheses are stated in the alternative form below.

$H_1$ : Information scope and organizational proactiveness are positively and significantly related to the coalignment of information scope and organizational proactiveness. (Figure 1,  $\gamma_1$  and  $\gamma_2 > 0$ ).

$H_2$ : The coalignment of information scope and organizational proactiveness is positively and significantly related to firm performance (Figure 1,  $\gamma_3 > 0$ ).

Figure 1: Proposed Model



## METHODOLOGY

### Modeling Strategy

Structural equation modeling employing the LISREL statistical package was used for the data analysis. This analytical technique incorporates several features which correlation-based techniques do not. These are: (1) latent constructs, (2) estimation of errors in the measurement of variables, and (3) simultaneous estimation of multiple interdependent relationships.

A confirmatory modeling strategy as described by Hair *et al.* (2006) was employed in the study. First, measurement of the constructs and variables is addressed. Finally, the fit of the model and the relationships among the constructs are analyzed.

### Measurement of the Constructs

All first-order constructs were measured using seven-point, Likert scales which have been used in previous research. Tables 1 through 3 show the scale items for each of the constructs. Table 4 provides the covariance matrix of the measured variables.

**Table 1: Information Scope Variable Scale Items**

To what extent is the information described provided to you through your firm's information system and is useful to you in decision making? If the described information is not provided to you through the information system, enter a number from the lower end of the scale.

- S1. Information which relates to possible future events (if historical information is most suitable for your needs, enter a number from the lower end of the scale).
- S2. Quantification of the likelihood of future events occurring (e.g., probability estimates).
- S3. Noneconomic information, such as customer preferences, employee attitudes, labor relations, attitudes of government and consumer bodies, competitive threats, etc.
- S4. Information on broad factors external to your organization, such as economic conditions, population growth, technological developments, etc.  
Nonfinancial information which relates to the following areas:
- S5. production or service information such as output rates, scrap levels, machine or employee efficiency, employee absenteeism, etc.
- S6. market information such as market size, growth, share, etc.

(If you find that a financial interpretation of production/service and marketing information is most useful for your needs, enter a number from the lower end of the scale.)

Measured on a scale of 1 to 7 where

1 = Not useful

7 = Extremely useful

**Table 2: Organizational Proactiveness Variable Scale Items**

To what extent does your firm engage in the following activities or the statement describes the way your firm does business?

- P1. Constantly seeking new opportunities related to the present operations.
- P2. Usually the first ones to introduce new brands or products in the market.
- P3. Constantly on the look out for businesses that can be acquired.
- P4. Competitors generally preempt us by expanding capacity ahead of us.<sup>R</sup>
- P5. Operations in the latter stages of the life cycle are strategically eliminated.

Measured on a scale of 1 to 7 where

1 = Not at all

7 = To an extreme extent

<sup>R</sup> Reverse scored

**Table 3: Firm Performance Variable Scale Items**

Evaluate your organization's performance in each of the following managerial activities.

- F1. Planning
- F2. Investigating
- F3. Coordinating
- F4. Evaluating
- F5. Supervising
- F6. Staffing
- F7. Negotiating
- F8. Representing

Measured on a scale of 1 to 7 where:

1 = Very low

7 = Very high

**Table 4: Covariance Matrix of the Variables**

	S1	S2	S3	S4	S5	P1	P2	P3	F1	F2	F3	F4	F5	F6	F7	F8
S1	3.43															
S2	2.30	3.36														
S3	1.29	1.69	3.92													
S4	1.67	2.17	2.76	3.79												
S5	1.41	1.71	2.32	2.48	3.96											
P1	0.26	0.29	0.52	0.82	0.47	1.85										
P2	0.56	0.45	0.78	0.60	0.88	0.92	3.40									
P3	0.51	0.43	0.33	0.76	0.42	0.93	0.64	3.66								
F1	0.12	0.41	0.38	0.49	0.46	0.65	0.68	0.21	2.40							
F2	0.24	0.24	0.22	0.53	0.25	0.77	0.41	0.49	1.07	1.86						
F3	0.12	0.07	0.06	0.26	-0.03	0.53	0.17	-0.12	1.13	1.01	1.74					
F4	0.04	0.15	0.16	0.35	0.18	0.64	0.27	0.13	1.16	1.04	1.09	1.73				
F5	-0.21	-0.16	0.04	-0.02	-0.04	0.41	0.21	0.06	0.77	0.50	0.79	0.85	1.27			
F6	-0.11	0.01	0.15	0.07	0.18	0.46	0.31	-0.08	0.96	0.66	0.81	0.90	1.07	1.70		
F7	0.30	0.20	0.20	0.41	0.12	0.74	0.34	0.24	0.93	0.88	0.83	1.07	0.62	0.89	1.97	
F8	0.27	0.21	0.31	0.43	0.15	0.70	0.55	0.24	0.92	0.83	1.11	0.92	0.64	0.78	1.15	1.91

Sx – Information Scope scale item

Px- Organizational Proactiveness scale item

Fx – Firm Performance scale item

Information scope was assessed using the scale, totaling six items, developed by Chenhall and Morris (1986) to measure the scope characteristic of information provided by management accounting systems. As

the management accounting system is an integral part of the management information system of any organization, this characterization was deemed representative of the information required of an organization's overall information system.

Organizational proactiveness was assessed through the scale, comprised of five items, developed by Venkatraman (1989) measuring the proactiveness dimension of the Strategic Orientation of Business Enterprise (STROBE) construct.

Organizational performance was measured using an eight-item scale developed by Mahoney, Jerdee, and Carroll (1963) which measures the respondents' assessments of their organizations' performance in accomplishing eight managerial tasks: planning, investigating, coordinating, evaluating, supervising, staffing, negotiation, and representing. Prior research has shown that managerial assessments of performance, as used in this study, are highly correlated with internally obtained objective performance indicators (Dess and Robinson, 1984) and objective performance indicators obtained from secondary data sources (Venkatraman and Ramanujam, 1986).

Coalignment was modeled as a second-order construct in the manner described by Venkatraman (1990) with two first order constructs, information scope and organizational proactiveness, as its indicators.

### **Sampling Frame and Data Collection Procedures**

The *Disclosure* database was chosen as the sampling frame for this study. From this database, firms operating in only one industry were identified. This resulted in 1,948 firms being selected as the sample.

Firms operating in only one industry were selected due to problems in analyzing the strategic actions of firms operating in multiple market segments. Chandler (1962) and Rumelt (1974) stated that it is difficult to analyze the strategic responses of firms operating in multiple product-market segments, as a separate strategy may be followed in each industry in which a firm operates.

The research instrument, accompanied by a cover letter explaining the study, was sent to the chief executive officers of the 1,948 firms. Follow-up letters were mailed six weeks later. Anonymity of the respondents could not be guaranteed as it was deemed desirable to identify the industry represented by each of the respondents. Responses were received from 210 firms, resulting in a response rate of 10.8 percent. Of these 210 responses, 149 were usable for the study, resulting in an effective response rate of 7.7 percent. These 149 respondents represent eighty-nine different industries. This response rate was deemed acceptable considering the level of the individuals to whom the research instrument was sent and the fact that anonymity of the respondents was not guaranteed.

## **DATA ANALYSIS**

### **Factor Analysis**

A factor analysis specifying oblique rotation and maximum likelihood extraction was performed on each of the measurement scales. The factor analyses revealed a number of items in two of the constructs (information scope and strategic proactiveness) which loaded incorrectly, reflected cross-loadings (.40 or greater on more than one factor), or did not have a significant loading (.40 or greater) on any factor. According to Hair *et al.* (2006), two options are available at this point in the analysis: (1) interpret the



solution as it is, ignoring the problem items, or (2) delete the problem items. The latter alternative was selected for this study. This resulted in one item being deleted from the information scope scale and two items being deleted from the strategic proactiveness scale. The final factor solution for all three constructs is presented in Table 5.

<b>Table 5: Factor Analysis</b>	
INFORMATION SCOPE	
Item	Loading
S1	0.89
S2	0.77
S3	0.73
S4	0.68
S5	0.58
Eigen	3.17
% Var	63.3
ORGANIZATIONAL PROACTIVENESS	
Item	Loading
P1	0.86
P2	0.43
P3	0.43
Eigen	1.62
% Var	53.9
FIRM PERFORMANCE	
Item	Loading
F1	0.81
F2	0.77
F3	0.7
F4	0.69
F5	0.68
F6	0.68
F7	0.68
F8	0.66
Eigen	4.84
% Var	53.7

## Non-response Error

Chapman (1992) indicated that anytime less than a response rate of 100 percent is obtained, the potential exists for the sample to be non-representative of the population of interest. However, Hunt (1990) argued that no manuscript should be rejected on the basis of potential non-response error unless there is good reason to believe that the respondents differ from the non-respondents on the important issues being analyzed and that these differences would make the results of the study unreliable.

Armstrong and Overton (1977) and Churchill (1991) recommended addressing non-response error by assessing the responses of early and late respondents. This was accomplished in this study by segregating the data into quartiles based on the dates on which the completed survey instruments were received. The first quartile represents the earliest responses, while the fourth quartile reflects the responses received last. The fourth quartile serves as a proxy for non-respondents. Chapman (1992) finds this characterization of late respondents as surrogates for non-respondents to be valid. Univariate and multivariate analyses of variance tests were conducted comparing the first and fourth quartile responses for each of the variables. Table 6 shows the comparisons for all sixteen variables utilized in this study. No differences between the first and fourth quartile data were found for any variable, with the exception of the P2 measure of organizational proactiveness. The results of this analysis suggest that non-response error is not a major consideration.

Variable	Quartile	Mean	Std Dev	F Value	p-value
S1	1	3.54	1.91	.02	.88
	4	3.62			
S2	1	3.00	1.93	.54	.46
	4	3.50			
S3	1	3.49	1.83	.00	.96
	4	4.18			
S4	1	3.43	1.98	.79	.38
	4	3.65			
S5	1	4.03	2.07	.17	.69
	4	4.32			
P1	1	5.46	1.26	1.24	.27
	4	5.47			
P2	1	3.95	1.65	6.09	.02
	4	4.06			
P3	1	4.05	1.98	.10	.75
	4	4.32			
F1	1	4.13	1.38	.70	.40
	4	4.26			
F2	1	3.46	1.66	.01	.90
	4	3.56			
F3	1	3.78	1.39	.32	.58
	4	3.68			

<b>Table 6: Assessment of Non-response Bias</b>					
<b>Analysis of Quartiles</b>					
F4	1 4	3.41 3.59	1.71	1.97	.16
F5	1 4	3.95 3.68	1.74	.78	.38
F6	1 4	4.41 5.03	1.47	.01	.92
F7	1 4	3.97 4.09	1.36	.22	.64
F8	1 4	4.68 4.56	1.26	.05	.82
<b>Multivariate Tests</b>					
			F Value	Exact	p-value
	Pillais		.28	.83	.78
	Hotellings		.32	.84	.77
	Wilks		.74	.84	.77
	Roys		.16		

## Reliability

Cronbach's alpha was calculated to assess the reliability of each of the modified item scales. These reliability estimates are reflected in Table 7. All, except the organizational proactiveness scale, reflect a Cronbach's alpha above the threshold of 0.60 deemed desirable by Nunnally (1967). The Cronbach's alpha of 0.54 associated with the organizational proactiveness scale is slightly below the desired value. However, Novick and Lewis (1967) proved that, in general, Cronbach's alpha is a lower bound of reliability and provides a conservative estimate of a measure's true reliability. Therefore, all measurement scales were considered to reflect adequate reliability and acceptable for further analysis.

<b>Table 7: Reliability Assessment of the Construct Measurement Scales</b>	
Construct	Reliability (Cronbach's Alpha)
Information Scope	0.85
Organizational Proactiveness	0.54
Firm Performance	0.88

### Estimation of Goodness of Fit of the Proposed Model

Table 8 shows the goodness of fit statistics associated with the proposed model. The p-value of .00 is less than the critical value of .05 and indicates poor fit as measured by the chi-square statistic. However, other research (Fornell and Larcker, 1981) has shown that the chi-square statistic presents limitations in its application to the evaluation of structural equation models. The GFI and AGFI measures of 0.86 and 0.81, respectively, are slightly below the acceptable value of 0.90 suggested by Bagozzi and Yi (1988). The total coefficient of determination (TCD) for the proposed model is 0.97, indicating a substantial amount of the variance of the structural equations is explained by the model. Finally, the RMSR of the model is 0.18. Bagozzi and Yi (1988) indicate that the RMSR value should be small.

Statistic	Value
X <sup>2</sup>	209.7
p-value	0
GFI	0.86
AGFI	0.81
TCD	0.97
RMSR	0.18

GFI – Goodness of Fit Index  
AGFI – Adjusted Goodness of Fit Index  
TCD – Total Coefficient of Determination  
RMSR – Root Mean Square Residual

### Assessment of Internal Fit of the Proposed Model

Internal fit of the proposed model was assessed through examination of the significance of the standardized loading estimates, standardized residuals, and the modification indices. These measures are shown in Table 9.

Variable	Loading Estimate	t-value
S1	0.55	<sup>B</sup>
S2	0.66	6
S3	0.77	6.56
S4	0.9	6.97

**Table 9: Loading Estimates of the Proposed Model<sup>a</sup>**

Variable	Loading Estimate	t-value
S5	0.71	6.28
P1	0.94	3.6
P2	0.4	3.47
P3	0.38	<sup>B</sup>
F1	0.68	<sup>B</sup>
F2	0.67	7.39
F3	0.77	8.39
F4	0.81	8.79
F5	0.68	7.54
F6	0.69	7.58
F7	0.68	7.55
F8	0.69	7.62
Largest Standardized Residual		6.84
Largest Modification Index		5.31
<sup>A</sup> All estimates are standardized		
<sup>B</sup> Item is used for scaling and no t-value is provided		
Sx – Information Scope scale item		
Px – Organizational Proactiveness scale item		
Fx – Firm Performance scale item		

An examination of the standardized loading estimates along with the associated t-values revealed that all exceed the critical value of +/- 1.64 (Bagozzi and Yi, 1988). An analysis of the standardized residuals revealed four exceeding the critical value of +/- 2.58 specified by Bagozzi and Yi (1988), with the largest is 6.84. Examination of the pattern of residuals for each pair of variables revealed one being associated with the information scope construct and three with the firm performance construct.

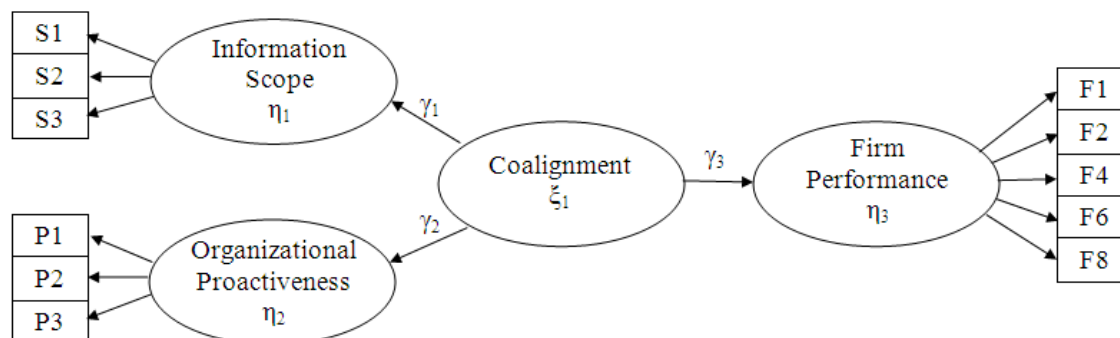
Examination of the modification indices revealed three exceeding the critical value of 3.84 (Bagozzi and Yi, 1988) with the largest being 5.31. In summary, examination of the internal fit criteria indicated that modifications to the model were necessary.

### Model Modification

Initial modification entailed deletion of the four variables (one associated with the information scope construct and three associated with the firm performance construct) associated with the offending residual pairs exceeding the critical value of +/- 2.58. No theoretical support for the changes suggested by the modification indices could be found. Bagozzi and Yi (1988) cautioned against making changes to the model suggested by modification indices when theoretical support is lacking.

The modified model is shown in Figure 2. The goodness of fit statistics for the modified model are shown in Table 10 and indicate that the overall goodness of fit was dramatically improved. All goodness of fit statistics far exceed the criteria suggested by Bagozzi and Yi (1988). This analysis of the goodness of fit measures provides strong support for the modified model.

**Figure 2: Modified Model**



**Table 10: Goodness of Fit Statistics of the Modified Model**

Statistic	Value
$X^2$	46.19
p-value	0.7
GFI	0.95
AGFI	0.92
TCD	0.86
RMSR	0.14

GFI – Goodness of Fit Index  
AGFI – Adjusted Goodness of Fit Index  
TCD – Total Coefficient of Determination  
RMSR – Root Mean Squared Residual

An examination of the loading estimates, standardized residuals, and modification indices also provides support for the modified model. As shown in Table 11, the t-values associated with the loading estimates of the indicator variables on their constructs all exceed the critical value of +/- 1.64. Analysis of the standardized residuals and modification indices revealed that none exceed the critical values of +/- 2.58 and 3.84, respectively. In the absence of theoretical and/or methodological reasons for further modifications, the model was tentatively accepted.

**Table 11: Loading Estimates of the Modified Model<sup>a</sup>**

Variable	Loading Estimate	t-value
S2	0.62	<sup>B</sup>
S3	0.78	7.61
S4	0.93	8.15
S5	0.71	7.11
P1	0.9	3.76
P2	0.42	<sup>B</sup>
P3	0.39	3.43
F1	0.71	7.55
F2	0.7	<sup>B</sup>
F4	0.8	8.33
F6	0.63	6.77
F8	0.64	6.92
Largest Standardized Residual		2.27
Largest Modification Index		3.52

<sup>A</sup> All estimates are standardized  
<sup>B</sup> Item is used for scaling and no t-value is provided  
Sx – Information Scope scale item  
Px – Organizational Proactiveness scale item  
Fx – Firm Performance scale item

### Tests of Hypotheses

As indicated earlier, acceptance of the coalignment model requires the testing of two hypotheses,  $H_1$  and  $H_2$ . Table 12 presents the path estimates and associated t-values for each of the hypothesized relationships.

The values reveal that significant positive relationships exist between information scope and coalignment, and between organizational proactiveness and coalignment. Therefore,  $H_1$  is accepted (the null of  $H_1$  is rejected). These values also indicate a positive and significant relationship between the coalignment of information scope with organizational proactiveness, and firm performance. Therefore,  $H_2$  is accepted (the null of  $H_2$  is rejected). Based on the goodness of fit criteria and the acceptance of hypotheses  $H_1$  and  $H_2$ , the modified coalignment model shown in Figure 2 is accepted.

**Table 12: Path Estimates of the Modified Model Relationships<sup>a</sup>**

Relationship	Parameter Estimate	t-value
Coalignment – Information Scope (H <sup>1</sup> )	0.36	3.45
Coalignment - Organizational Proactiveness (H <sup>1</sup> )	0.96	4.18
Coalignment – Firm Performance (H <sup>2</sup> )	0.55	4.91

<sup>a</sup> All estimates are standardized

## DISCUSSION AND SUGGESTIONS FOR FUTURE RESEARCH

This study extends the research on the relationships between the elements of information systems design and organizational factors, such as strategy. The degree of coalignment, or fit, between information scope and organizational proactiveness was found to have a positive effect on firm performance. These results provide support for the proposition that organizational characteristics should be considered in the design of information systems.

The results of the study are subject to several limitations. First, for analytical reasons addressed earlier, the sampling frame was confined to publicly-traded firms limiting their operations to a single industry. The results presented may not be applicable to firms which are privately-held or operate as conglomerates.

Second, issues in the measurement of the variables were raised in this study. The factor analyses of the measures of information scope and organizational proactiveness required deletion of one and two variables, respectively, due to items which cross-loaded, loaded incorrectly, or failed to load on any factor.

Third, the source of the data for this study was chief executive officers. There is a possibility of key informant bias when information taken to represent the characteristics of an entire organization is obtained from a single respondent (Huber and Power, 1985). Gorry and Scott Morton (1971) noted that different types of information are required at different levels of decision-making within organizations. Chief executive officers can only be reasonably expected to be familiar with the characteristics of the information provided to them for decision-making. Information used in decision-making at lower levels within the organization may exhibit different characteristics.

Also, this study incorporates one element of information systems design, information scope, and one element of organizational orientation, proactiveness. Analyses incorporating other dimensions of information systems design and organizational orientation should also be conducted.

Finally, this research only examines the consequent effect of the coalignment of information scope and organizational proactiveness on firm performance. Future research should be conducted to identify the antecedent variables which affect these constructs.

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