Journal of Medical Systems, Vol. 23, No. 6, 1999

Analysis of Integrated Healthcare Networks' Performance: A Contingency-Strategic Management Perspective

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Few empirical analyses have been done in the organizational researches of integrated healthcare networks (IHNs) or integrated healthcare delivery systems. Using a contingency derived context-process-performance model, this study attempts to explore the relationships among an IHN's strategic direction, structural design, and performance. A cross-sectional analysis of 100 IHNs suggests that certain contextual factors such as market competition and network age and tax status have statistically significant effects on the implementation of an IHN's service differentiation strategy, which addresses coordination and control in the market. An IHN's service differentiation strategy is positively related to its integrated structural design, which is characterized as integration of administration, patient care, and information system across different settings. However, no evidence supports that the development of integrated structural design may benefit an IHN's performance in terms of clinical efficiency and financial viability.

KEY WORDS: IHN; strategy; integration.

INTRODUCTION

In recent years, healthcare studies or managerial reports have drawn on economic and organizational theories to discuss the potential benefits of functionally integrated healthcare systems or networks (IHNs).[1,2] The presumed benefits include improving the quality of care, improving services, improving accessibility, enhancing product offerings, strengthening customer relationships, improving operating efficiency, and reducing unit costs. In the real world, however, researchers have noted that many of the "integrated systems" are systems in name only and do not function in an integrated fashion.[3]

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0148-5598/99/1200-0467$16.00/0

Several case studies have pointed out that "integration" does not necessarily make an organization good. For example, *Modern Healthcare's* 1996 survey revealed that among 37 health maintenance organizations (HMOs) owned by integrated providers, 10 HMOs posted losses and 8 HMOs had declines in net income.[4] The preliminary financial result of the Detroit-based Henry Ford Health System, which now owns managed care plans, hospice programs, and ambulatory care networks at more than 70 sites, indicated that it lost $43.8 million in 1998 compared to a net income of $37 million in 1997. Moreover, the Henry Ford Health System announced it would cut its work force by 425 employees by April 1999.[5]

Viewing IHNs in general, managerial experts have recently given some suggestions about how to run (i.e., design and manage) them to achieve organizational effectiveness.[6,7] However, there is still only limited empirical evidence to support their opinions. Moreover, the few existing empirical studies[8] tend to simply view an integrated organization as the various forms of ownership and strategic alliance among various medical providers and insurers, but do not focus on the goals of integration mechanisms from the viewpoint of organizational design, including integrated administration, patient care, information, and finance.

Contingency theorists argue that the effectiveness of an organization lies in the fit between organizational internal structure and external environments. On the other hand, rather than embracing rational system assumption that administrators are highly constrained by the external environment, strategic contingency theorists assert that administrators have the power to choose the best way for an organization to prevail. Given the relative lack of empirical evidence to support either group's opinions about how to effectively manage an IHN, this study attempted to identify the factors that may influence the performance of an integrated healthcare network. It is aimed to identify the relationships among organizational contextual factors, strategic directions, structural designs, and performance.

DEFINITION OF INTEGRATED HEALTHCARE NETWORKS

Integrated or *integration* is commonly viewed as a catch-all term, representing "a point on a continuum of the various levels and types of interrelationship in any service integrated initiative"[9] in order to achieve the missions and goals of health services organizations. Integration can be applied in two directions: vertical and horizontal. In the business vocabulary, vertical integration means to "integrate different stages of productions," and horizontal integration means to "lump together several locations of the same production stages."[10] One application of integration in the health care industry is integrated healthcare networks or integrated healthcare delivery systems, structures in which the various types of organizations are connected together along a continuum of care, using horizontal and vertical integration.[1,11]

In this study, the definition here of an IHN is "an organization that, through ownership or formal agreements, vertically and horizontally aligns healthcare facilities, programs, or services in order to offer a coordinated continuum of health care to a defined geographic population and is willing to be held responsible clinically

(i.e., improving quality) and fiscally (i.e., reducing costs) for the health status of that population[12,13]; the healthcare facilities, programs, or services can be health plans, medical group practices, pharmacies, hospitals, subacute care services, long-term care services, occupational services, rehabilitation services, surgical centers, or various wellness and patient education programs. This operational definition has its advantage prior to other definitions proposed in the previous studies, including to clarify the unique structural relationships among the member components (i.e., vertical and horizontal alignments) and to emphasize the core mission of an IHN from the standpoint of a coordinated continuum of health care.

THEORETICAL FRAMEWORK

In the early twentieth century, classical management theorists claimed that an organization has "a best way" to be organized and managed. That implied that all organizations would own the "same" organizational styles or structures. In the 1960s, several theorists[14-17] challenged this assumption by applying a "contingency approach" to propose that there is no best way to organize an organization, and that an organization's effectiveness lies on the best match or adaptation between organization's internal features and the demands of organizational environments.

Strategic contingency theorists criticize conventional contingency theorists who presume that organizational structure is driven by the environment. They argue that organizations become what they are not only because of the environment, but also because of choices made by members, especially choices about strategy and organizational design. As Thompson's,[18] in *Organizations in Action,* puts it, "organizations are not determined simply by their environments." He also points out that "administration may innovate on any or all of the necessary dimensions, but only to the extent that innovations are acceptable to those on whom the organization can and must depend." Instead of assuming that administrators are highly constrained in their decisions, strategic contingency theorists emphasize "the importance of choice," that is, "the freedom of agency."[19] Furthermore, Pfeffer[20] explicitly points out that "organizational structures are the outcomes of political contests within organizations." Terreberry[21] argues that an organization's success in adapting to its environment lies in whether the organization can learn how to adjust to changes in its environments and situations. Under given environments and situations, an organization can apply appropriate strategies to achieve its missions and goals, and to ensure its profits and survival as well.

Based on the core nature of the contingency-strategic management perspective,[22-24] a contingency context-process-performance conceptual framework for this study is presented in Fig. 1. Three important components are delineated: (1) **contextual factors,** such as organizational external environments and internal competencies or characteristics; (2) the **process factors,** including organizational strategic direction and functionally structural designs; and (3) organizations' **performance.**

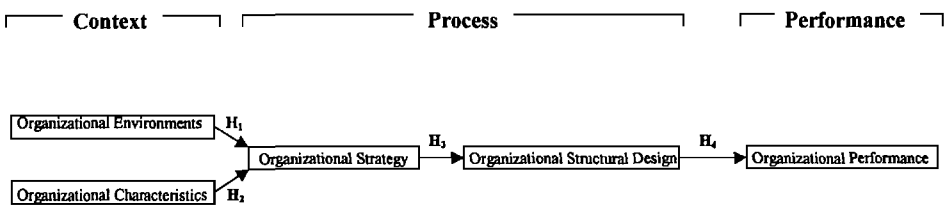

Fig. 1. The conceptual framework of the study: Contingency context-process-performance framework.

HYPOTHESES

Using the contingency contextual-process-performance framework (Fig. 1), four hypotheses are developed as follows.

The Relationship of Organizational Context and Strategy Direction

From the point of view of resource dependence, an organization has to maintain a balance between linkages with other organizations and its own independence when responding to the need for resources from the environment. It is suggested that organizations often try to reach out and change or control elements in the environment in order to survive. Overall, two strategies are often used to manage resources and adapt to the environment: (1) the establishment of inter-organizational linkages; and (2) the control of environmental domains.[25,26]

Using the classification of organizational strategy proposed by Hofer and Schendel,[27] the strategic directions of an IHN can be categorized into three levels: corporate, business, and functional. Corporate strategy, which can be set up as a health network's contract variability with the third-party payers, shows how a network tries to establish relationships with outside entities and extend its market niche so as to capture more patients. Non-hospital services, which are set up to extend the fully developed continuum of medical services, can be viewed as a business strategy that a network uses to meet the increasing demands of non-hospital-services (i.e., outpatient services and after-acute care services) in the managed care environment and to increase its competitive ability in the product-market segmentation. Functional strategy, which emphasizes how to maximize resource productivity, can be directed as HMO affiliation, which is characterized as having a strong consensus to control costs and reduce utilization.[28] From an integrated healthcare service provider perspective, therefore, a network's corporate strategy (i.e., contract variability), business strategy (i.e., non-hospital-services), and functional strategy (i.e., HMO affiliation) can be viewed as organizational marketing-oriented strategy or service differentiation strategy that tries to guide an IHN to respond to their markets, attract sufficient resources, convert these resources into appropriate services, and communicate them to various consumers to survive, succeed, and meet customers' changing needs.

The changing environments in the health care industry offer both challenges and opportunities for innovative strategies addressing coordination and control.

Therefore, it is expected that an IHN with a higher degree of service differentiation strategy is more likely to respond to the market dynamic and structural change, and to market competition. Therefore, the following hypothesis is postulated.

Hypothesis 1. An integrated healthcare network's service differentiation strategy is positively associated with managed care penetration and market competition.

Economic theory predicts that private for-profit organizations will behave differently from not-for-profit organizations because the organizational objective of for-profit organizations is to make the most possible profit.[28,29] One can argue that not-for-profit organizations' missions and goals focus mainly on utility maximization through improving patient satisfaction and developing service differentiation to increase geographic coverage, provide a full continuum of care, and focus more on community health and affairs. Therefore, it is suggested that a not-for-profit IHN is more likely to adopt service differentiation strategy, addressing coordination and control in the market to provide a continuum of health care.

Bohlmann[30] has argued that understanding and accepting an alternative strategy is an important part of reality. An old story for many industries is "out of the frying pan, into the fire." To act on emotion without looking for logical alternatives may risk an organizational survival. In other words, an organization needs time to evaluate itself and its competitors and to develop responses to its external environment.[31] Therefore, it suggests that older networks are more active in adopting service differentiation strategy. Thus, a hypothesis can be formulated as follows.

Hypothesis 2. An integrated healthcare network's service differentiation strategy is positively associated with its not-for-profit status and age.

The Relationship of Organizational Strategy and Structural Design

An organization's structural design reflects its goals and strategies. The ever-increasing complexity of organizational relationships gives the service differentiation strategy, in terms of purchasers expansion (i.e., corporate strategy), the inclusion of HMOs (i.e., functional strategy) and the establishment of non-hospital-facilities or -services (i.e., business strategy), both challenges and opportunities that point out the coordination and control. It has been noted that a key to the success of integration among different entities is to adopt the coordinative mechanisms that support it, including an administrative mechanism to coordinate the operations of various health care services; a management information system that integrates clinical, utilization, and a financial data system to follow clients across different settings; a care coordination program such as case management or disease management that works with clients to arrange health care services; and a financial mechanism that enables pooling of funds across services.[13,32]

Therefore, the development of integrated structural design in an IHN including the development of integrated interentity structure, care coordination, integrated information system, and integrated financing may make service differentiation strategy more flexible and adaptive to the competitive environment. The hypothesis is postulated as follows.

Hypothesis 3. An integrated healthcare network's extent of integrated structural design is positively related to its service differentiation strategy.

The Relationship of Organizational Structural Design and Performance

In integrated healthcare delivery systems, a complexity of the tasks of top managers is to integrate various units and position the network to meet its goals and objectives and to face the environmental challenges. Integrated structural design is a theoretical concept that suggests the need for coordination to effectively and efficiently run an organization. The structural design of integration mechanisms in an IHN includes the integration of administrative and governance structure, information system, care coordination, and financing.[32] It has been shown that an integrated healthcare delivery system that is more integrated has more potential to provide accessible coordinated care across the continuum and appears to be associated with higher levels of inpatient productivity, greater total system revenue, greater total system cash flow, and greater total system operating margin than are found in a less integrated system.[35] In addition, from the managerial perspective, integrated structural design has been addressed for the success of integrated organizations.[36,37] Therefore, a hypothesis is derived:

Hypothesis 4. An integrated healthcare network's performance (i.e., clinical efficiency and financial viability) is positively associated with its extent of integrated structural design.

METHODS

This is a nonexperimental, cross-sectional study, with the individual IHNs as the unit of analysis. The sample was 100 IHNs listed in the *IHN Top 100 Directory* (1998), which were assessed to be the nation's top integrated health systems of the total, around 500, operating in the United States, through the overall system evaluation by the SMG Marketing Group in terms of contractual capabilities, physicians, services and access, systemwide integration, utilization, and financial positions. The *IHN Top 100 Directory* (1998), which carries information that profiles the nation's 100 leading IHNs, is compiled and published by the SMG Marketing Group Inc., and AHA press. In this study, this database was merged with *InterStudy Competitive Edge* (as of July 1, 1996), which provides information about the percentage of HMO penetration in the metropolitan service areas.

Measurement of the Study Variables

Definition of IHN Market Area

In defining the market area of individual IHNs, the variety of organizational complexity and geographical dispersion is a major challenge. In this study, an IHN's market service area is based on self-reported major IHN metropolitan service area(s) (MSA(s)) carried in the *IHN Top 100 Directory* (1998) because of availability and accuracy to capture much more complete environmental conditions compared to other methods.

Measurement of Environmental Factors

For a long time, managed care has affected the behavior of medical organizations in the U.S. health care industry. In this study, managed care penetration is measured as HMO penetration (X_1: PEN). HMO penetration for individual IHN market is defined as the total HMO enrollments in an IHN divided by the total population in the same service area.

Two variables are used to describe the market structure of an IHN: (1) the number of IHN competitors within a defined IHN market (X_2: COM), and (2) the concentration in each IHN's market as measured by the market dominance index (MDI) (X_3: MDI). An IHN is considered as a competitor of IHN_i if its market overlaps that of IHN_i. A market dominance index, similar to a Hirschman-Hirfindal index,[33,34] was constructed and calculated to reflect the degree of concentration in a market and can be considered a critical determinant of market competition. The MDI is formulated as the sum of the squared market shares of all the IHNs in the focused IHN market. The market share of an IHN is calculated as the hospital inpatient admissions of each IHN divided by the total number of hospital admissions in the market where it is located. It should be mentioned that non-IHN-related and IHN-related hospitals in an IHN market area are both included in counting the total number of hospital admissions, rather than including IHN-related hospitals only. Similar to the Hirschman-Hirfindal index, the MDI is equal to one when a single monopoly supplier is in a market, and as more competitors exist in the market, the value of MDI approaches zero. In other word, as the MDI increases, the degree of competition decreases.

Measurement of Organizational Characteristics

Organizational tax status is an important factor that may influence an organization's missions and goals. Tax status (X_4: STA) of the individual IHNs is dichotomized into two categories: for-profit (coded 0) and not-for-profit (coded 1). The age of an IHN (X_5: AGE) is measured as the number of years from when a network formed to 1997, for which the data are analyzed. Age is expected to be an important factor that influences a network's capability to develop organizational strategic direction.

Service Differentiation Strategy

Service differentiation strategy is a latent construct, which is characterized as the combination of an IHN's corporate strategy, functional strategy, and business strategy, measured by three indicators: contract variability (Y_1: CON), HMO affiliation (Y_2: HMO), and non-hospital-services (Y_3: NHOS), respectively.

For the measurement of contract variability (CON), three types of contracts: capitated direct-to-employer contracts, networkwide capitated managed care contracts, and networkwide managed care contracts, are counted. A network that holds all three types of contracts is given the highest score (3), followed by networks with two kinds of contracts (2), with one kind of contract (1), and no contracts at all (0). The higher the score, the higher the contract variability of an IHN.

HMO affiliation (HMO) is measured by the number of HMO memberships

in an IHN. Non-hospital-services (NHOS) are measured as the ratio of non-hospital facilities, practices, or programs in an IHN.

Integrated Structural Design

In this study, integrated structural design (INTER) is a latent variable, which is characterized as integrated interentity structure, clinical integration, integrated information system, and integrated financing. Integrated leadership (Y_4: LEA), which is measured as whether or not the IHN's executive management team has leader representatives from the full spectrum of facility types, is an indicator to represent an IHN's development in integrated interentity structure. The development of case/disease management (Y_5: DCM) is viewed as an indicator to emphasize clinical integration or care coordination/team works in an IHN. Integrated information technology (Y_6: INF) shows an IHN's efforts to establish an integrated information system in clinical medical services and administration. In addition, integrated purchasing (Y_7: PUR) is an indicator to show the development of integrated financial management across operating units. These four indicators LEA, DCM, INF, and PUR are categorical variables in this study.

Clinical Efficiency

In this study, clinical efficiency—used as a natural term denoting levels of either efficiency or inefficiency—refers to process and cost efficiency in medical services, measured respectively by average hospital length of stay (Y_9: LOS) and charges per hospital admission (Y_{10}: EXP). Higher average hospital length of stay and higher charges per hospital admission are indicators of poor clinical efficiency. Therefore, the construct of clinical efficiency is inversely related to the indicators: average hospital length of stay (LOS) and charges per hospital admission (EXP).

Financial Viability

In this study, financial viability is a latent variable shared by three indicators: net incomes or excess of revenue (Y_{11}: INC), operating margin (Y_{12}: OPE), and profit margin (Y_{13}: PRO).

The difference between total revenues and total expenses is called "net income" or "operating income" (i.e., profit) in for-profit organizations. In not-for-profit organizations, however, that difference is called "excess of revenues, gains and other support over expenses" or "excess of revenues over expenses." It can be viewed as an indicator of organizational efficiency, because the fewer resources or expenses used for every dollar of revenue generated, the higher the efficiency and the greater the organization's profit.[37]

Profit margin is the ratio of net income to net operating revenue. Operating margin is "the difference between the revenues received from providing services and the expenses required to support these revenues as a percentage of total revenues."[37] Profit margin and operating margin are two of the profit ratios, sometimes called performance ratios, that indicate how well off an organization is financially from its profits or changes in net assets. Therefore, these ratios can provide information to use in evaluating the performance of health care organizations.

Overall Ranking Score of an IHN's Integration

The overall ranking score is the value used by the SMG Marketing Group's IHN Rating System to identify the 100 most integrated health systems, which were included as the sample in this study. The higher the scores, the larger extent of the claim that IHNs "have gone the furthest in developing services for the coming millennium by building organizations that boast not only of geographic reach, but of coordinated systems of care."[38] This variable is used to validate whether the sampled 100 most integrated health systems were in fact rewarded by better performance in terms of clinical efficiency and financial viability.

Data Analysis

The multivariate statistical approach of structural equation modeling (SEM), also known as linear structural relationships (LISREL) or covariance structural model, was the primary analytical technique in this study. A SEM or LISREL model contains two parts: the measurement model and the structural equation model. The measurement model is used to validate how the latent variables are measured by the observed indicators, and the structural equation model tries to specify the causal relationship among exogenous and endogenous variables. The process involves model construction, parameter estimation of the model, the test of the fit of the model, and model modification.[39-41] The structural-equation modeling for the conceptual model in this study was showed in Fig. 2.

The reasons to use LISREL in this study were: (1) Many studied variables were correlated, so the problem of multicollinearity among them may bias regression estimates; and conventional regression methods were very restrictive to statistical assumptions. (2) IHNs' strategic direction, structural design and performance are considered underlying constructs measured by the related indicators. (3) The measurement models can specify the relations between the observed variables and the latent constructs when correlated measurement errors are considered. (4) The

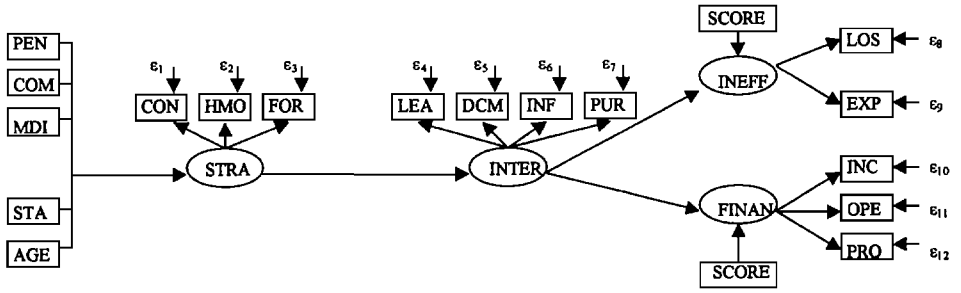

Fig. 2. Structural Equation Model for the Study of an IHN's Performance. Note: PEN—HMO penetration; COM—market IHN competitors, MDI—market dominance index; STRA—service differentiation strategy; CON—contract variability; HMO—HMO affiliation; NHOS—non-hospital-services; INTER—integrated structural design; LEA integrated leadership; DCM—case/disease management; INF—integrated information technology; PUR—integrated purchasing; INEFF—clinical efficiency; LOS—length of stay; EXP—charges per hospital admission; FINAN—financial viability; INC—net income; OPE—operating margin; PRO—profit margin; SCORE—IHN overall ranking score.

measurement models' goodness of fit for the underlying constructs can be validated before they are incorporated in the structural equations. (5) LISREL modeling can detect correlated errors that are often encountered in the study of multiple causal factors.[42,43]

The maximum likelihood estimation procedure used in the structural equation modeling assumes that the data have a multivariate normal distribution. The violation of the assumption of normality may bias the statistic and the standard errors of the parameter estimates, but not affect the parameter estimates themselves. Therefore, the continuous variables, which violate the normality distributions, were transformed in this study.

RESULTS

Comparison between the Study Sample and the Population of Integrated Healthcare Networks

The sampled 100 IHNs listed in the *IHN Top 100 Directory* (1998) are non-specialty, regional IHNs. A comparison of the study sample and the population characteristics in Table I suggests that the 100 sampled IHNs were larger, in terms of facilities and access, had higher acute care admissions, had better financial performances such as net income, net patient revenues, operating margin, and profit

Table I. Comparison Between the Top 100 Integrated Healthcare Networks (IHNs) and Total IHNs[a]

	Study sample	Study population
	Top 100 IHNs	Total IHNs
Facilities/access		
Average number of hospitals in an IHN	10	6
Average number of alternate site locations	33	13
Average number of zip codes covered by IHN facility locations	27	12
Utilization		
Average acute-care admissions	87,381	46,135
Occupancy rate	0.59	0.59
Average length of stay (days)	5.4	5.8
Financial positions		
Net income	$47,027,856	$22,715,660
Net patient revenue	$804,318,074	$419,327,661
Operating margin	2.18	−0.21
Profit margin	6.87	5.36
Debt to capitalization ratio	0.41	0.43
Current ratio	2.01	2.04
Physicians		
Average number of physicians in an IHN	2,644	873
Primary care physicians versus physician specialists	32.93% vs. 67.07%	32.54% vs. 67.46%
Tax status		
Not-for-profit	87%	86%

[a]Data Source: *IHN Top 100 Directory* (1998).

margin, had higher number of physicians, and were geographically located more in seven states: California, Michigan, Florida, Illinois, Missouri, Minnesota, and Texas (data not shown). However, similar situations were found in the occupancy rate, average length of stay, debt to capitation ratio, current ratio, the ratio of primary care physicians versus specialist physicians, or tax status.

Data Analysis

Characteristics of the study sample (n = 100) are shown in Table II in terms of the IHNs' environments, strategic directions, structural designs, clinical efficiency, financial positions, and organizational characteristics. Analysis of Moment Structure

Table II. Descriptive Statistics of the Study Variables (n = 100)

	Label	Mean statistic	Std. deviation statistic
Context			
Environmental factors			
HMO penetration	PEN (X_1)	0.30	0.13
Market competitors	COM (X_2)	5.69	4.90
Market concentration	MDI (X_3)	0.16	0.09
Organizational characteristics			
			Frequency
Tax status	STA (X_4)	Profit	13
		Not-for-profit	87
Age (years)	AGE (X_5)	9.76	14.14
Organizational strategic direction			
Service differentiation strategy	STRA		
Contract variability	CON (Y_1)	1.79	0.795
HMO affiliation	HMO (Y_2)	0.58	0.768
Non-hospital-services	NHOS (Y_3)	0.74	0.18
Organizational design			
Integrated structural design	INTER		Frequency
Integrated leadership	LEA (Y_4)	No	78
		Yes	22
Disease/case management	DCM (Y_5)	None	44
		Either	26
		Both	30
Integrated information technology	INF (Y_6)	No action	12
		Working to integrate	49
		Integrated	39
Integrated purchasing	PUR (Y_7)	No	15
		Yes	85
Organizational performance			
Clinical efficiency	INEFF		
Average hospital length of stay (days)	LOS (Y_8)	5.42	1.12
Charges per hospital admission ($10,000)	EXP (Y_9)	0.97	0.25
Financial viability	FINAN		
Net incomes ($100,000,000)	INC (Y_{10})	0.47	0.37
Operating margin	OPE (Y_{11})	2.14	6.39
Profit margin	PRO (Y_{12})	6.84	4.81
Overall ranking score			
Score for an IHN	SCORE	65.61	5.90

(AMOS 3.6), a multivariate statistical package, was used to validate the measurement models of latent variables (confirmatory factor analysis) and test the structural equation model of IHN performance.

Analysis of Measurement Models

The measurement models were validated by confirmatory factor analysis. Four latent endogenous variables—service differentiation strategy, integrated structural design, clinical efficiency, and financial viability—were independently examined. Analysis of the maximum likelihood estimates for the individual parameters and overall model fit was performed. Estimates reported include factor loadings (λs), critical ratios, and square multiple correlations (SMCs). The factor loadings, or standardized regression coefficients in the general regression model, show the relationships (magnitude and direction) between the observed variables and their corresponding latent constructs. The critical ratio is computed as the parameter estimate divided by its standard error. With the standard normal distribution assumption, the estimate is significantly different from zero at the 0.1 level when an estimate has a critical ratio greater than 1.645 (in absolute value).[44] Based on substantive considerations, constraints were imposed to make sure that only one set of acceptable parameter values was provided. The square multiple correlation is used to assess how good or reliable an indicator is to measure the construct that it is supposed to measure (Sharma, 1996). The chi-square goodness-of-fit indices and relevant indices are used to test the overall model fit, which explain how well the data fit the model.[41,45]

For the measurement model of service differentiation strategy, three indicators, construct variability (CON), HMO affiliation (HMO), and non-hospital services (NHOS), were examined. Table III shows that the factor loadings for CON, HMO, and NHOS are 0.24, 0.22, and 1.00, respectively. The critical ratios for CON and HMO are 2.49 and 2.29, respectively, and are significant at the 0.05 level. The squared multiple correlations for CON, HMO and NHOS are 0.06, 0.05, and 1.00.

For the measurement model of integrated structural design, four indicators, integrated leadership (LEA), case/disease management (DCM), integrated infor-

Table III. Maximum Likelihood Estimates for the Measurement Model of Latent Construct: Service Differentiation Strategy

Latent variable and their indicators	Regression estimation lambda	Critical ratio (CR)	Squared multiple correlation
Service differentiation strategy (η_1)			
Contract variability (CON)	0.24	2.49[a]	0.06
HMO affiliation (HMO)	0.22	2.29[a]	0.05
Non-hospital-services (NHOS)	1.00	(constrained)	1.00
Chi-square: 0.22			
Degree of freedom (d.f.): 1			
Chi-square/d.f.: 0.22			
Goodness of fit (GOF) index: 1.00			
Adjusted goodness of fit (AGOF) index: 0.99			

[a] $p < 0.05$ level.

Table IV. Maximum Likelihood Estimates for the Measurement Model of Latent Construct: Integrated Structural Design

Latent variable and their indicators	Regression estimation lambda	Critical ratio (CR)	Squared multiple correlation
Integrated structural design (η_2)			
Integrated leadership (LEA)	0.37	1.90[a]	0.14
Case/disease management (DCM)	0.46	1.96[a]	0.21
Integrated information technology (INF)	0.66	(Constrained)	0.43
Integrated purchasing (PUR)	0.27	1.61	0.07
Chi-square: 1.66			
Degree of freedom (d.f.): 2			
Chi-square/d.f.: 0.83			
Goodness of fit (GOF) index: 0.99			
Adjusted goodness of fit (AGOF) index: 0.99			

[a] $p < 0.1$ level.

mation technology (INF), and integrated purchasing (PUR), were validated. Table IV shows that the factor loadings of LEA, DCM, and INF are 0.37, 0.46, and 0.66, respectively, with significance at the 0.1 level. However, PUR shows no significant relationship at 0.1 level with LEA, DCM, and INF, to explain the common construct of integrated structural design, perhaps as a result of the limited diversity in PUR: 85 of the 100 IHNs have developed integrated purchasing (see Table II). Thus, the variable "PUR" was deleted in further analysis.

For the measurement model of clinical efficiency, two variables, average length of stay (LOS) and charges per hospital admission (EXP), were validated. Both indicators LOS and EXP are inversely related to the concept of clinical efficiency. Table V shows that the factor loadings for LOS and EXP are 0.32 and 1.00, respectively and that the C.R. value for LOS is significant at the 0.01 level. The squared multiple correlations are 0.10 for LOS and 1.00 for EXP.

For the measurement model of financial viability, three indicators, net incomes

Table V. Maximum Likelihood Estimates for the Measurement Model of Latent Construct: Clinical Efficiency

Latent variable and their indicators	Regression estimation lambda	Critical ratio (CR)	Squared multiple correlation
Clinical efficiency			
Average length of stay (LOS)	0.32	3.35[a]	0.10
Charges per hospital admission (EXP)	1.00	(constrained)	1.00
Just-identified model			
Goodness of fit (GOF) index: 1.00			

[a] $p < 0.01$ level.

(INC), operating margin (OPE), and profit margin (PRO) were tested. Table VI reveals that the factor loadings for INC, OPE, and PRO are 0.65, 0.72, and 1.000, respectively. The C.R. value of INC and OPE are significant at the 0.01 level. The squared multiple correlations for INC, OPE, and PRO are 0.42, 0.52, and 1.00, respectively.

The four validated measurement models of service differentiation strategy, integrated structural design, clinical efficiency, and financial viability were used for the analysis of the causal model.

Analysis of Causal Model

The causal model, which contains both the measurement models and the structural equation models, examines the relationships among the constructs or variables. Four hypotheses that are characterized the relationships among organizational contextual factors, strategic direction, structural design, and performance, were tested. Table VII summarizes the standardized parameter estimates for the causal model of IHNs' performance for the 100 sampled integrated healthcare networks. As seen in Table VII, it was found that market IHN competitors (COM) is significantly and negatively related to the development of service differentiation strategic direction (STRA) at 0.1 level (hypothesis 1). In addition, organizational characteristics—network tax status (STA) and age (AGE)—play an important role in explaining the development of service differentiation strategic direction (STRA) (hypothesis 2). Inspection of data reveals that an IHN's service differentiation strategy is positively related to the establishment of integrated structural design at 0.1 level (hypothesis 3). However, no evidence is found that an IHN's integrated structural design (INTER), which is characterized an IHN's efforts to develop integration in terms of structural design of functional operation, benefits an IHN's performance in terms of clinical efficiency and financial viability (Hypothesis 4). In addition, the overall ranking score (SCORE), proposed by SMG Marketing Group's IHN Rating System to select their top 100 integrated healthcare networks, is also not significantly associated with an IHN's clinical efficiency and financial viability. Therefore, the

Table VI. Maximum Likelihood Estimates for the Measurement Model of Latent Construct: Financial Viability

Latent variable and their indicators	Regression estimation lambda	Critical ratio (CR)	Squared multiple correlation
Financial viability			
Net income (INC)	0.65	8.42[a]	0.42
Operating margin (OPE)	0.72	10.69[a]	0.52
Profit margin (PRO)	1.00	(Constrained)	1.00
Chi-square: 0.01			
Degree of freedom (d.f.): 1			
Chi-square/d.f.: 0.01			
Goodness of fit (GOF) index: 1.00			
Adjusted goodness of fit (AGOF) index: 1.00			

[a] $p < 0.01$ level.

Table VII. Standardized Parameter Estimates for the Causal Model of the Performances of Integrated Healthcare Networks

Predetermined variables	Endogenous variables			
	Service differentiation strategy (η_1)	Integrated structural design (η_2)	Clinical efficiency (η_3)	Financial viability (η_4)
HMO penetration (PEN)	−0.10			
Market IHN competitors (COM)	−0.17[a]			
Market dominance index (MDI)	0.02			
Tax status (STA)	0.27[b]			
Age (AGE)	0.17[a]			
IHN overall ranking score (SCORE)			−0.04	0.06
Service differentiation strategy (η_1)		0.28[a]		
Integrated structural design (η_2)			−0.03	0.23
R^2	0.18	0.08	0.03	0.06
Chi-square: 208.43				
Degree of freedom: 103				
Chi-square/d.f.: 2.02				
Goodness of fit (GOF) index: 0.83				
Adjusted GOF index: 0.74				

[a] $p < 0.1$ level.
[b] $p < 0.01$ level.

America's 100 top IHNs have not demonstrated positive effects on the performance indicators of clinical efficiency and financial profitability yet.

The overall model fit indices presented in Table VII reveal that the structural equation model does not fit the data perfectly, with a chi-square/d.f. of 2.02, GOF index of 0.83, and adjusted GOF index of 0.74. Future use of other database that, for example, includes all the integrated healthcare networks operating in the United States, is suggested to verify the proposed theoretical model.

DISCUSSION

The multivariate analysis in this study supports the notion that an IHN's certain contextual factors—market competition (COM), tax status (STA), and age (AGE)—do influence the development of service differentiation strategy (Hypotheses 1 and 2). For example, it found that not-for-profit IHNs tend to adopt service differentiation strategy. This has been further confirmed by a recent publication that shows that 95% of the newly ranked top 100 IHNs that have achieved systems' level integration and offer a full continuum of care are not for profit.[5] In addition, this study indicated that an IHN's age is positively related to its development of service differentiation strategy and it may imply that the integration effort of an IHN to provide a continuum of health care and to address coordination and control in its market is an evolution process and does need time and experience to implement. However, unexpectedly, it is found that an IHN in the more competitive environment is negatively related to the development of its service differentiation strategy. It may be the case that a certain market with more IHN competitors to

share the same background supply and demands for the practitioners and customers may reduce the opportunities for individual IHNs to contract or affiliate unlimitedly with outside third-party payers, managed care organizations, or non-hospital facilities and thus freeze an IHN to the extent to expand its member components.

There is a positive association between an IHN's service differentiation strategy and integrated structural design. Thus, hypothesis 3 is confirmed—the notion proposed by the several case studies and managerial comments that the establishment of integrated structural design, which is characterized as integrating administration, patient care, and information system—is a way to coordinate all the settings in an integrated health system.[46-50] However, this study revealed that an IHN with a higher degree of integrated structural design is not significantly associated with a network's cost and process efficiency of medical services or financial profitability. Thus, hypothesis 4 is not supported in this study. The tradeoffs between willingness to engage in integration effort of integrated structural mechanism to smooth internal functional operations and willingness to maintain organizational clinical efficiency and financial profitability may be an important issue for an organization's top decision-makers to consider before establishing a truly integrated care delivery system in the future.

This study is a pilot study to attempt to identify the factors that may influence the performance of IHNs. Cautions are needed in generalizing the results to all IHNs, because of several limitations pertaining to data source, sample, measurements, and study design. The limitation of generalizability in this study comes mainly from the sample (100 IHNs) in terms of its data source, selection, and operational definition. As mentioned earlier, the *IHN Top 100 Directory* (1998) was used to provide the study sample. The reasons to use this database are that (1) this database gives integrated system an operational definition from the continuum of care point of view, and (2) this database carries on the information about the networks' integrated structural status and the strategic indicators that can help us to do a complete analysis in the theoretical framework. However, it may be the first time that people use this database to do some empirical analysis, the generalizability and reliability should be checked and further tested in the future study. In addition, the studied sample in this study is 100 IHNs, which were ranked as the most integrated health systems in America based on several criteria. Therefore, it may result in the small variations in the measured variables and in turn, may result in several non-significant findings in this study. Otherwise, the sample selection bias is another limitation because there do exist several distinctive characteristics between the study sample and population. In addition, the findings of this study are much more applicable to a healthcare network whose structure (i.e., vertical and horizontal alignment) and missions are similar to this operational definition.

The second major limitation lies on the measurement of the study variables. For example, an IHN's market service area is based on the MSA. However, from the academic perspective, the definition of market service area for an IHN using only the unit of MSA may either underestimate or overestimate the potential organizational operations and customers' utilization behaviors outside the MSA(s). Also, MDI in this study tends to explain the market concentration from hospital perspective and assumes that all entities have the same organizational behaviors

and background supply and demands. In addition, the measurement of an IHN's performance is focused only at the hospital level due to the data availability.

The lack of longitudinal data in the study subject is a limitation of the analytical design. The cross-sectional study can establish only the relationships among the constructs or variables, but not the causal relationships. The establishment of causal relationship has to rely on a dynamic model that enables investigators to examine the changes over time. In addition, the small sample size limits the capability to include more study indicators (i.e., measures) in the structural equation model.[51] Future study should seek a larger sample size, to enhance the capability of the modeling test to tease out potential confounding factors that may affect an IHN's strategic direction, integrated structural design, and performance.

Several contributions can be pointed out in this study. First, from the theoretical perspective, this study provides a comprehensive contingency and strategic management framework. The proposed model of IHNs' performance has avoided the pitfalls of most studies that have shown a fragmentary viewpoint of the contingency perspective on organizational research.[23] Using existing data to profile the IHNs adds knowledge about organizations and also offers empirical evidence to strengthen the knowledge base for organizational theory.

Second, from the methodological point of view, the most notable contribution of this study resulted from the use of an operational definition and measurements of "integration." The use of the operational definition of an integrated healthcare delivery system from organizational structure and a continuum of care points of view clarifies that an "integrated" organization is much more than just a phenomenon or a simple form of joint ownership and strategic alliance among multiple medical providers and insurers. Also this study first attempted to develop the measurement of integrated structural design of an IHN in a way that is much more concrete and measurable, allowing managers to design their integrated organizations for the future. Furthermore, the use of the multiple indicator modeling approach helps to validate the measurement model's goodness of fit for the theoretical underlying constructs and, simultaneously, to examine the relationships among organizational context, strategic direction, structural designs and performance.

Third, from a practical management point of view, this study has identified the issues that were either ignored, addressed only conceptually, or only partially tested in previous reports or studies. Through the use of a theoretical framework, this study is able to raise questions that may create a new research agenda and provide administrators with hints for restructuring their operations for the future.

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