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Effects of Leadership Behavior on Knowledge Management and Organization Innovation in Medicine and Health Sciences

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ARSTRACT

It is wondered how traditional medical industry responds to the information era with new knowledge economy. In fact, medical industry is a knowledge-intensive and humanoriented service industry. The interaction among professional staff at various working systems in hospitals, patients visiting hospitals daily, and the upstream and downstream suppliers for medical activities forms an extremely useful knowledge database. Although the application of information technology is not the whole definition of knowledge management, the entire medical industry, based on other traditional factors, is not ranked on the top for the utilization of modern information technology, compared to other industries. For this reason, establishing a special knowledge management environment with the knowledge-intensive and human-oriented characteristics of medical industry is a worthy goal. Aiming at primary hospitals in Shanghai, the management level, physicians, and employees are distributed 360 copies of questionnaire. Total 288 valid copies are retrieved, with the retrieval rate 80%. The research results summarize the positive relations between 1.leadership behavior and knowledge management, 2.knowledge management and organization innovation, and 3.leadership behavior and organization innovation. Finally, suggestions are proposed, expecting to have leaders in medical industry guide the organization to become a self-learning organism and, meanwhile, practice knowledge management in the organization to digitalize the generation, storage, and expansion process of knowledge within the organization.

Keywords: medical industry, knowledge management, leadership behavior, organization innovation

INTRODUCTION

Following the prosperity of society and economy in China, the citizens have gradually stressed on medical quality and healthcare ideas to intangibly enlarge the demands for the quality and quantity of medical service. Moreover, medical industry is approaching the characteristics of organizations to facilitate the emergence of various types of medical institutions and result in infinitive competition pressure in medical markets. It becomes an urgent issue to enhance the medical quality with the knowledge in medical industry to further create long-term competitive advantages. Medical industry is a knowledge-intensive and manpower-intensive service industry. Among the intangible assets, "human quality" is essential. Under the changeable environment, the formulation of strategies is rather difficult and leaders have to clearly know the development direction of the industry in the future and the needs of consumers as well as constantly review and update current strategic objectives. The vitality of an enterprise

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State of the literature

- A leader often promoted the internal change capability of the organization by establishing the vision of changes, developing members' intention and ability to participate in changes, adjusting the structure arrangement of the organization.
- Under the changeable environment, the formulation of strategies is rather difficult and leaders have to
 clearly know the development direction of the industry in the future and the needs of consumers as well
 as constantly review and update current strategic objectives.
- It is therefore critical for a leader to move one's heart, encourage the employees climbing over high peaks, and create the self-development and problem-solving environment.

Contribution of this paper to the literature

- A leader in medical industry is suggested to keep the influence in the organization so that the employees
 could be affected by the leadership behavior and to promote the operation of knowledge management
 through the strong culture in the organization.
- A leader in medical industry is suggested to continuously keep the leadership style and the leading management innovation, to pay attention to the execution of strategies, cope with environmental changes with active innovation strategies.
- It requires a lot of time to establish knowledge sharing systems in medical industry; especially, it would enhance the burden of colleagues in the beginning of the establishment. Thinking from the role and status of a supervisor, a leader has to strive for support from the upper level and persuade the cooperation of the subordinates that a supervisor might give up spending time on thinking how to establish the system.

is maintained by corporate culture that powerful corporate culture would help the enterprise pass the frustration and challenge in the development process and turn crises into opportunities. A leader therefore has to formulate flexible overall corporate strategies, guide the organization to become a self-learning organism, and, meanwhile, practice knowledge management in the organization to digitalize the knowledge generation, storage, and expansion process in the organization and form the powerful corporate culture, aiming to practice the strategies and achieve the high-performance objective. Effective management has to be combined with organizational strategies and knowledge management as well as consider leaders' behaviors and attitudes. Merely when a leader integrates knowledge management into the strategies and share and communicate with employees about the strategic objectives and management advantages of the organization to form the corporate culture and environment which could accept changes at any time would various plans be practiced and preset objectives be achieved. Leadership is the clear vision to internalize value into members and to create the environment for achieving tasks. Since the environment is changing, an organization, according to the problems encountered in the business management, would constantly propose new solutions. It is therefore critical for a leader to move one's heart, encourage the employees climbing over high peaks, and create the self-development and problem-solving environment.

LITERATURE AND HYPOTHESIS

Leadership behavior

A leader would first establish the direction with the outlined vision and then communicate and encourage people to overcome obstacles so as to acquire the cooperation (Duffy et al., 2012). Leadership is an influential process; the difference between a leader and a manager lies in the motivational patterns and the thinking and behavioral model of a leader (Wu et al., 2011). The quality of leadership is closely related to the survival of the organization. Jiang et al. (2014) defined leadership as the process of a leader guiding the organizational members to practice the plans for changes and moving toward the objective of changes. Aghdasi et al. (2011) mentioned that the theory of leadership was about complete after the development in past four or five decades. From early Trait

Theory, Behavioralism to Situationism, it could be discovered that researchers attempted to include the most critical leadership behavior into the theories. Gray-Stanley & Muramatsu (2011) indicated that a leader's personality and social, psychological and intelligent characters were the key factors in Trait Theory and such characters were exclusive to the leader. Behavioralism considered that Trait Theory could not decide effective leadership behavior and explained from the aspect of behaviors that effective leadership relied on a leader adopting specific leadership behavior. Situationism, on the other hand, extended Behavioralism and took more situational factors into account that it was the most effective leadership style a leader could choose (Yeboah, 2012).

Referring to Hon (2012), leadership behavior is divided into three dimensions in this study.

- (1) Leadership style: The degree of a leader applying democracy, including 1.the degree to understand employees' interests and needs, 2.the degree to establish harmonious peer relationship, 3.the degree to respect employees' reasonable needs, and 4.the degree in expectation of employee.
- (2) Professional authority: Leadership authority contains authority of expert, authority of position, authority of promise, and authority of power. A leader well applies such authority to convince the employees by 1.realizing the importance of a leading post, 2.in-service training and self-fulfillment, 3.developing professional spirits and reinforcing professional behaviors, and 4.abusing leadership authority.
- (3) Counseling skill: In addition to instructing works, a leader has to undertake the task to develop employees' physical and psychological health, including 1.developing the concern to participate in counseling work, 2.applying peer relationship, 3.paying attention to employees' individual differences, 4.constructing and applying employees' data, and 5.referring employees to accepting special counseling and consultation.

Knowledge management

Harris et al. (2014) pointed out knowledge management as the essential measures for engaging in information collection, decision, and action to keenly cope with changes of external environment and practicing flexible management to cope with distinct situations. Meanwhile, it was also a comprehensive strategy for the constant innovation of an enterprise. Wu et al. (2012) referred knowledge management as the effective application of the intellectual assets of an enterprise and the integration of brains of proper staff for brainstorming. Clark & Baker (2011) considered to construct an effective knowledge system in a knowledge-based enterprise so that the organizational knowledge could be effectively created, circulated, and valued to constantly generate innovative products. Zacharia et al. (2011) regarded knowledge management as a strategic issue aiming at value creation in order to adapt to the complex society. Knowledge management could enhance the quality and quantity of creative knowledge in an organization and reinforce the knowledge practicability and value. Kim (2012) indicated that any activities which could effectively enhance the value of knowledge assets belonged to knowledge management; such activities contained knowledge inventory, evaluation, supervision, planning, acquisition, learning, circulation, integration, protection, and innovation. Dulebohn et al. (2012) explained knowledge management as any management strategies and processes which could assist enterprises, groups, or individuals in creating, classifying, storing, sharing, and updating knowledge through information technology and generate real value for enterprises, groups, or individuals.

Referring to Hon & Chan (2013), who considered knowledge management as a business process and a program which the company created and use the knowledge, three dimensions are covered.

- (1) Organizational learning: The program of a company acquiring information or knowledge.
- (2) Knowledge production: The program to convert and integrate original information into the knowledge for solving business problems.
- (3) Knowledge distribution: The program allowing organizational members accessing and using common knowledge in the company.

Organization innovation

Organization innovation is an option for current situations to change organization systems with plans, change the input/output relationship, change the technology or transformation process, change the organization

structure or design, change cooperation mechanisms, change organization members and roles, change organizational culture, and innovate the situations at all levels in an organization (Fahmy, 2013). The changes of potential to generate wealth with existing resources could constitute innovation (Jamaludin, 2011). Lee & Ok (2012) regarded it as the process of an individual or worker, in order to cope with the changing environment, responded to the environment with the creativity and the process to transform products, processes, or programs through the improvement of technological and production processes and the design and development of new products. "Technological innovation" (including product, process, and facility) and "management innovation" (containing system, policy, program, and service) used to be regarded as the presentation of "organization innovation" (Camelo-Ordaz et al., 2001). Innovation was an endogenous variable of economic development; in other words, working with different methods in any economic fields was innovation (Hollet-Haudebert et al., 2011). Chen et al. (2014) indicated that innovation was the creation of new products, services, and processes for an enterprise; most successful innovation would be affected by the gradual changes of concepts or methods. Innovation was a new idea which could be applied to start or enhance certain products, processes, or services, covering product innovation, new production process and technology, new structure and management system, and new plans and management programs (De Wit et al., 2012). Organization innovation is the generation, acceptance, and execution of new concepts, programs, products, or services, including the processes of product creativity, alliance creativity, realization creativity, and migration creativity, which cover the transformation and application of knowledge, the connection of information, the changes of service, and the reuse of resources (Chen et al., 2014).

Referring to the definition of innovation proposed by Chou & Lee (2015), dual-core model is used for exploring the types of organization innovation that two dimensions of "management innovation" and "technological innovation" are extended.

- (1) Management innovation: Referring to various plans, organizations, employment, leadership, and control, which are either purchased externally or generated internally, being affirmed the contribution by organizational members.
- (2) Technological innovation: Referring to various facilities, processes, and products, which are either purchased externally or generated internally, being affirmed the contribution by organizational members.

Research on leadership behavior and knowledge management

Maslow observed that, in an outstanding group, tasks would not be separated from the group; in other words, when an individual strongly agreed with the task, such task should be contained in the definition of the person (Nabirye et al., 2011). There is not a learning organization without a common vision; and, the core competency of an enterprise would not be easily established without a learning organization (Le Blanc & González-Romá, 2012). In other words, a common vision provided "focus and energy" for learning that an individual expanded the self-creation ability through creative learning. A successful leader therefore could create individual vision and guide people to possess the common vision to work for the organization and approach the objectives. Van Vianen et al. (2011) pointed out the attitude of professional staff regarding knowledge as private properties and not sharing the knowledge and experience with others that supervisors, with the attitude of possessing information as possessing power under traditional hierarchical organizations, would present the selfishness on the transparency of information. For this reason, the executives in an enterprise have to practice special management tactics to motivate knowledge exchange and share in the organization to form the corporate culture beneficial to knowledge share. Aghdasi et al. (2011) revealed the important effects of people's value and belief on organizational knowledge. Podsakoff et al. (2012) found out the positive effect of innovation culture and learning culture of an organization on the knowledge workers' creation and application of knowledge processing. Jiang et al. (2014) revealed that a high-level manager thoroughly mastering the internal and external information of the company would guide the employees to the active development and innovation; and, the "consideration and initiating structure leadership" styles with thorough empowerment to the subordinates would explain the establishment of the entire knowledge management so that the organizational knowledge could be stored and expanded through learning, integration, and systemization to shorten learning time.

From above studies, the following hypothesis is inferred

H1: Leadership behavior presents positive relations with knowledge management.

Research on knowledge management and organization innovation

Nagar (2012) stated the significant effect of knowledge management on organization innovation and proposed that financial experts, when evaluating a company value, would inspect the tangible assets and profitability and measure the corporate intelligence, as the knowledge assets and knowledge management ability of an enterprise would determine the potential of the company creating added value and the future development. Vassiliki (2012) referred knowledge management as "the organizational culture value formed by the knowledge assisting an organization in the efficient and effective management to intangibly facilitate the organizational members automatically engaging in knowledge activity." Liang et al. (2013) showed that when an organization promoted knowledge management, the introduction of knowledge management was not the completion of the program; instead, the outcome after introducing the knowledge management should be evaluated, and a feedback system should be formed for the continuous development of the knowledge management system. Harris et al. (2014) concluded that knowledge management aimed to extract major data of knowledge in the organization from different sources for storing and memorizing the data for the use of organizational members and the organization innovation to promote the competitive advantages of the enterprise. Sussan (2012) indicated that the primary condition for an enterprise creating high organization innovation was to establish a sharing corporate culture and environment. In order to create efficient and effective knowledge management performance, the value of knowledge management culture form by an enterprise would intangibly facilitate the organizational members automatically engaging in knowledge activity. Accordingly, the following hypothesis is deduced.

H2: Knowledge management shows positive relations with organization innovation.

Research on leadership behavior and organization innovation

Tse et al. (2012) interpreted that transformational leadership presented self-confidence and vision, was full of the image characters of strong expectation and extraordinary behaviors, and showed innovative organizational culture capability to promote the organization. In addition to the organizational culture being guided by a leader, the flexible organizational culture should be established to satisfy organizational members and fulfill organizational objectives. Matin et al. (2012) proved that a powerful corporate culture was the major factor in good organization innovation. Fahmy (2013) also found out the effect of corporate culture on the innovation performance of an organization. Jamaludin (2011) studied the relationship between corporate culture and organization innovation and discovered the relations among corporate culture, industry characteristics, and organization innovation, but a "no winning" culture. Omilion-Hodges & Baker (2013) also found out different organization innovation performance caused by various types of leadership styles, corporate culture, and competition strategies. According to above research, the following hypothesis is inferred.

H3: Leadership behavior reveals positive relations with organization innovation.

SAMPLE AND MEASUREMENT INDICATOR

Research sample and object

Aiming at Primary hospitals in Shanghai, the management level, physicians and employees are studied. Total 360 copies of questionnaire are distributed, and 288 copies are retrieved, with the retrieval rate 80%. Primary hospitals are the top-level hospitals in China. According to "Classification of Chinese Hospitals", those acquire the score above 900, have more than 501 sick beds, and could provide high-level professional medical services for several areas and execute higher education and research tasks are evaluated as primary hospitals.

Reliability and validity test

Validity refers to the measuring tool being able to really measure the problems which researchers would like to measure. Generally speaking, validity is divided into content validity, criterion-related validity, and

construct validity. The questions in the questionnaire for this study are referred to domestic and international researchers, and the formal questionnaire is distributed after the pretest which is done after discussing with tutors that it presents certain content validity. The structural causality among leadership behavior, knowledge management, and organization innovation is verified with Linear Structural Relations Model, and the data entry is based on the correlation coefficient matrix of observed variables in this study. The analysis result with Linear Structural Relations Model reveals the overall model fit achieving the reasonable range that it presents favorable convergent validity and predictive validity. According to Kerlinger's (1986) suggestion, item-to-total correlation coefficients could also be used for verify the construct validity of the questionnaire content, i.e. reliability analysis, and the acquired item-to-total correlation coefficients could judge the questionnaire content. The item-to-total correlation coefficients of the dimensions in this study are over 0.7, showing certain construct validity of the dimensions in this study. To further understand the reliability and validity of the questionnaire, reliability and validity analyses are preceded. According to the viewpoint of Cuieford (1965), the higher Cronbach's α reveals the better reliability. The measured Cronbach's α reliability coefficient of the formal questionnaire appears in 0.78~0.91, apparently conforming to the reliability standard.

ANALYSIS OF EMPRICAL RESULT

LISREL model evaluation indicator

LISREL (linear structural relation) model combines Factor Analysis and Path Analysis in traditional statistics and includes simultaneous equations in econometrics that it could simultaneously calculate multiple factors and multiple causal paths. Regarding the model fit assessment, Bagozzi (1998) suggested to evaluate the preliminary fit criteria, overall model fit, and fit of internal structural of model.

The research data are organized in **Table 1**. The preliminary fit criteria, fit of internal structural of model, and overall model fit are explained as below.

From **Table 1**, regarding the preliminary fit criteria, three dimensions of leadership behavior (leadership style, professional authority, counseling skill) could significantly explain leadership behavior (t>1.96, p<0.05); three dimensions of knowledge management (organizational learning, knowledge production, knowledge distribution) could remarkably explain knowledge management (t>1.96, p<0.05); and two dimensions of organization innovation (management innovation, technological innovation) could notably explain organization innovation (t>1.96, p<0.05). Apparently, the overall model presents favorable preliminary fit criteria.

In regard to the fit of internal structural of model, leadership behavior shows positive and remarkable correlations with knowledge management (0.882, p <0.01), knowledge management reveals positive and notable correlations with organization innovation (0.871, p <0.01), and leadership behavior presents positive and significant correlations with organization innovation (0.857, p <0.01) that H1, H2, and H3 are supported.

In terms of overall model fit, the overall model fit standards appear $\chi 2/Df$ =1.288, lower than the standard 3, and RMR=0.005, showing that $\chi 2/DF$ and RMR are proper. Moreover, chi-square value is sensitive to sample size that it is not suitable for directly judging the fit. However, the overall model fit standards GFI=0.974 and AGFI=0.913 are higher than the standard 0.9 (the closer GFI and AGFI to 1 reveal the better fit), that this model presents better fit indicators.

CONCLUSION

The research results show that profession, efficiency, integrity, stability, innovation, and service quality are emphasized in medical industry and the interaction with businesses and the public is close. In this case, a leader in medical industry should present macro and permanent vision and management ideas for the continuous development and sustainable management to cope with the globalization trend in the future as well as pass down and cultivate each employee's value and belief so as to cohere the great power, create quality corporate culture, and commonly make efforts for the corporate objectives. Corporate culture, the behavioral norms constantly existing in an organization, instructs the thinking methods of organizational members and guides the employees

Table 1. Overall analysis with linear structural relation model

Evaluation item	Parameter/evaluation s	tandard	Result	t
preliminary fit criteria	leadership behavior	leadership style	0.698	7.83**
		professional authority	0.667	6.78**
		counseling skill	0.683	7.12**
	knowledge management	organizational learning	0.715	9.16**
		knowledge production	0.704	8.66**
		knowledge distribution	0.721	9.74**
	organization innovation	management innovation	0.796	10.42**
		technological innovation	0.802	11.55**
fit of internal structural of model	leadership behavior→knowledge management		0.882	56.44**
	knowledge management→organization innovation		0.871	42.17**
	leadership behavior→organization innovation		0.857	34.76**
	X2/Df		1.288	
overall model fit	GFI		0.974	
	AGFI		0.913	·
	RMR		0.005	

Note: * stands for p<0.05, ** for p<0.01, and *** for p<0.001.

Table 2. Hypothesis test

Research hypothesis	Correlation	Empirical result	Р	Result
H1	+	0.882	P<0.01	Supported
H2	+	0.871	P<0.01	Supported
H3	+	0.857	P<0.01	Supported

of working standards. Researchers discovered that employees' work efficiency could be enhanced, when corporate culture matched with internal culture of employees, to affirm with corporate objectives and value, be willing to continuously stay in the enterprise, and make more efforts to corporate objectives. Besides, various incentive strategies could be applied to promote employees' motivation and higher-level needs, lead medical industry to break through current situations with organization innovation, and pursue higher objectives of the organization. Colleagues in an organization in medical industry would share knowledge and rapidly spread knowledge to enhance the work efficiency and present positive effects on the organization innovation. The collection and storage of knowledge is an important work for organization innovation in medical industry. Collecting and storing knowledge is convenient for passing down that is the intangible assistance in organization innovation.

SUGGESTION

By concluding the results and findings, practical suggestions are proposed as following.

(1) A leader in medical industry is suggested to keep the influence in the organization so that the employees could be affected by the leadership behavior and to promote the operation of knowledge management

- through the strong culture in the organization and the active innovation strategies in order to achieve better management innovation standard and create better technological innovation level.
- (2) A leader in medical industry is suggested to continuously keep the leadership style and the leading management innovation, to pay attention to the execution of strategies, cope with environmental changes with active innovation strategies, meanwhile, guide the employees collecting environment and market information and well apply strategy types for the response so as to enhance the organization innovation.

Establishing a knowledge management system to shape the knowledge sharing culture: It requires a lot of time to establish knowledge sharing systems in medical industry; especially, it would enhance the burden of colleagues in the beginning of the establishment. Thinking from the role and status of a supervisor, a leader has to strive for support from the upper level and persuade the cooperation of the subordinates that a supervisor might give up spending time on thinking how to establish the system. The promotion of systems in medical industry is handed over from the upper level to the lower level that the units would do the best to support the business. When the knowledge sharing system in medical industry is assigned by the upper level, unit departments would naturally establish it. Besides, whenever the supervisor presents the intention to support knowledge sharing, (s)he would be willing to promote and execute the business and encourage the employees presenting with specific texts and actions. The atmosphere of knowledge sharing in the organization would then be naturally formed.

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