

Effect of Learning Organization on Organizational Communication and Organizational Creativity in High-Tech Industry

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ABSTRACT

In face of the rapidly changing economic environment, the competitive advantages on which high-Tech Industry used to depend for the development are disappearing. The value of high-Tech Industry no longer depends on the possession of plants, equipment, and products, but on the intellectual property, customer confidence, and teamwork ability of business partners, infrastructure of telecommunications, and employees' creative potential and skills. How to construct the environment climate, in high-Tech Industry, for employees being happy to work, creating knowledge, learning, communicating and sharing as well as to guide employees' goals being consistent with organizational objectives to continuously contribute to the organization is the motivation of this study. Aiming at supervisors and employees of manufacturers in Weihai Torch Hi-Tech Science Park in Shandong Province, total 500 copies of questionnaire are distributed in this study. 376 valid copies are retrieved, with the retrieval rate 75%. The research results conclude that 1.learning organization presents positive and significant effects on organizational communication, 2.organizational communication reveals positive and remarkable effects on organizational creativity, and 3.learning organization shows positive effects on organizational creativity. According to the results, conclusion and suggestion are proposed, expecting to help high-Tech Industry become learning organizations and promote organizational communication and organizational creativity.

Keywords: high-tech industry, learning organization, organizational communication, organizational creativity

INTRODUCTION

Globalized competitive trend, changes of consumption patterns, technology innovation, and rapid development of information technology have created a new arena for global enterprises. In face of the rapidly changing economic environment, the competitive advantages on which high-Tech Industry used to depend for the development are disappearing. A lot of traditional business models are no longer practicable to the environment nowadays. High-Tech Industry need to actively cope with external environment changes and rapidly respond to customer requirements. Peter Ferdinand Drucker revealed that the next society would be a knowledge society, and knowledge was the capital of a knowledge economy. For this reason, the new economy in the 21st century is knowledge economy. In the knowledge economy era, the value of high-Tech Industry is not to possess plants, equipment, and products, but the intellectual property, customer confidence and teamwork ability of business partner, infrastructure of telecommunications, and employees' creative potential and skills.

The largest resource of high-Tech Industry is "Third resource" ---- knowledge resource, which stands out after capital and labor. Workers in the workplace need to be able to apply new technologies, active thinking, and innovation to transform into knowledge work patterns. The most valuable enterprises in the 21st century are those based on knowledge. Furthermore, "knowledge workers" have become the key assets of high-Tech Industry that

Contribution of this paper to the literature

- High-Tech Industry are suggested in this study to provide employees with formal or informal learning opportunities. Learning organization in high-Tech Industry is a key factor.
- High-Tech Industry must reinforce the internal organizational communication channels, mainly focusing on employees and supervisors at different levels in the organization. Formal and informal communication methods could be used for the communication with employees.
- High-Tech Industry must understand individual needs of employees to enhance organizational creativity. The major capital of high-Tech Industry is the internal members.

the success of high-Tech Industry requires outstanding people constantly learn new knowledge to create high value-added products and make profits. Nevertheless, good employees do not necessarily present good performance. Especially, with the promotion of employees' educational background and expectation, managers have to encourage employees through leadership and creation of open and flexible work environment in order to enhance the job satisfaction. It becomes the motivation of this study how leaders in high-Tech Industry (organizations) construct the environment climate for employees being happy to work, creating knowledge and learning, communicating and sharing as well as guide employees' individual goals being consistent with organizational objectives to continuously contribute to the organization.

LITERATURE AND HYPOTHESIS

Learning Organization

Khosravi & Ahmad (2013) proposed learning organization as an organization combining knowledge management, intellectual asset management, innovation, organizational learning, individual learning, and information system as well as an organization being able to facilitate the learning and transformation of itself and business members (Atalay et al., 2012). It presented a change management method, particularly stressed on the enhancement of employee value and decisions sharing as well as the establishment of a learning community having the employees contribute to the work and organization (Lee, 2012). An organization had to continuously change, adapt, develop, and learn to adapt to the environment with organizational learning, change, and innovation (Cheung et al., 2013). Liu & Li (2012) indicated that learning organization should stress on sharing, mutual learning among organizational members, actively collecting organization internal and external information, cooperatively learning with suppliers and customers, creating value, and acquiring competitive advantages. Boden et al. (2012) further considered learning organization as to deeply plant the abilities of learning, accommodation, and change in the organizational culture and emphasize information sharing, mutual learning among organizational members, and more effectively training employees, including acquiring competitive advantage through information technology, knowledge, and the establishment of work team (Agarwal et al., 2012). Learning organization is an ideal type of organization being able to precede more efficient learning to further enhance the development of organization (Nazar, 2013) as well as to empower employees, enhance employees' organizational commitment, and reduce the needs of bureaucratic organization (Yazici, 2012). Ganjinia et al. (2014) proposed that learning organization allowed organizational members constantly expanding the abilities, creating really satisfactory results, being able to cultivate new-style thinking, fulfilling shared vision, and constantly learning to learn together so as to lay the foundation for success.

Referring to Cheng & Fu (2013), five dimensions are proposed for learning organization in this study.

- (1) System thinking: System thinking refers to getting rid of rigid and fragmented thinking to solve organizational problems, observing the factors and interaction of events and the changing process of organization problems, rather than fragmented individual events, with comprehensive vision to avoid ignoring the integrity of problems for immediately solving problems.
- (2) Personal mastery: Personal mastery means to cultivate organizational members' self-challenging mind to confirm the achievement of goals, as well as do the best and focus on it. When encountering frustration, the nervous emotion is the induction to be the source of individual creativity. Organizational members could more easily succeed by overcoming the emotional withdrawal reaction and properly proceeding introspection, adjustment, and revision.
- (3) Mental model: Traditional bureaucratic organizations believe in the emphasis on management, organization, and control, while a learning organization believes in vision, value, and mental model. Merely by encouraging organizational members to improve mental models and induce diverse viewpoints and opinions would group wisdom be induced and consensus be condensed in the opinions exchange or action practice process.

- (4) Shared vision: Building shared vision is a bottom-up organizational communication process, and the establishment of vision presents the progressive indicator, as an endless task.
- (5) Team learning: The key to establish team learning lies in the “dialogue” and “discussion” abilities among organizational members. Such dialogue emphasizes to explore the truth with the principle of seeking difference from commonness. Dialogue allows organizational members facing the obstruction in the thinking to further face the fact and learn to appreciate different opinions and develop higher consensus.

Organizational Communication

Black (2013) indicated that communication in an organization was to provide message, enhance mutual understanding among employees, encourage the job morale, promote job satisfaction, and expect to present good work performance. Martin & Beckmann (2013) regarded communication as a dynamic process, including several factors of sender & recipient (individual or group), media (language or non-language), and messages (opinions, concepts, attitudes, thought, knowledge, and information) as well as systematic, containing source, message, channel, reception, and feedback. The sender and recipient of communication might be an individual or one or many groups and could mutually understand, establish consensus, and achieve objectives through various communication media, tools, languages, symbols, or channels. Al-Busaidi & Kamla (2013) regarded “organizational communication” as a generalized concept, including the exchange of internal and external message of an organization. Jarrahi & Sawyer (2013) considered organizational communication as any processes in which a member in an organization transmitting the decision premise to another members. Chung et al. (2012) pointed out organizational communication as the message transmission and reception of organization members in order to achieve the organization objectives; the objective of organizational communication was operated through the communication network of the organization. Klitmoller & Luring (2013) mentioned that 85% individual success at work depended on effective communication with people. For an organization, a successful organization has to communicate with organizations and the staff at different level and departments in the organization in order to effectively precede tasks.

Referring to Chen et al. (2012), four dimensions are covered in organizational communication in this study.

- (1) Informatability: Providing members with information required for work.
- (2) Adjustability: Guiding member behaviors to benefit the organization operation.
- (3) Persuasibility: Persuading members’ intention to conform to the organization.
- (4) Integrity: Integrating the action and operation among members or departments to enhance the organizational efficiency.

Organizational Creativity

Elenurm (2012) defined organizational creativity as the application of creativity in the organization operation which could have the organization better face the environment change. Keller & Yeaple (2012) regarded organizational creativity as valuable and useful new products, services, ideas, processes, or procedures created through individuals in the complicated social system. Aslam et al. (2014) regarded organizational creativity as multi-level, which could not only invent products but also contained the creativity of new management system, such as improving working method and creating new functions. Lars & Thomas (2012) indicated that organizational creativity was the ability of an organization pursuing changes and creating new objects. It was acquired by an individual with creation potential applying creative thinking and, under the support and encouragement of the organizational system, constantly engaging in creative behaviors to generate innovative results, expecting to cope with environmental challenges, maintain competitive advantages, and further control the changes to become a forward-looking organization. Blome et al. (2014) stated that a cooperation-oriented organizational culture could reduce the factors in creativity, allow organizational members proposing new ideas in the free and open environment, and reduce organizational members’ anxiety when offering ideas. Lin et al. (2012) considered that organizational creativity would be affected by technology factors, group characteristics, organizational characteristics and systems, and social & cultural characteristics.

Referring to Chen & Cheng (2012), it is also considered in this study that creation is the continuous changes of an individual or a group as well as unprecedented performance of cognition, affection, and intention, and the performance would have oneself, individuals, or created field enter higher-lever changes. Creativity generally contains several basic cognitive abilities in divergent thinking; such abilities could be understood through test tools or evaluators’ observation, as explained below (Nagati & Rebolledo, 2014).

- (1) Fluency: Fluency refers to the quantity of individual concept output, i.e. the ability to propose several different possible programs or solutions aiming at a question. When a student proposes several responses at the concept output stage, the thinking presents fluency (Pinjani & Prashant, 2013).

- (2) Flexibility: Flexibility refers to the ability of an individual changing the thinking direction, i.e. being able to find out different applications or new concepts with various ways of thinking when problems occur. In other words, the individual could adapt to various conditions and does not treat problems with inherent habits and rigid thinking. "Poverty demands change, change carries development and permanence follows development", "inferring other things from one fact", and "understanding something by means of a process of inference" are the specific performance of flexibility.
- (3) Originality: Originality refers to an individual being able to come out with unique and innovative ideas, i.e. the ability to do unexpected things or generate different points of view from others. Even though the same stimulation is received, different ideas from others would be come out that the fewer similarities to others, the higher originality is presented. It is similar to the performance of "A solitary red flower among the green plants", "a triton of the minnows", and "outstanding others".
- (4) Elaboration: Elaboration is an idea of supplement, referring to individual ability of adding new concepts to the original ideas, i.e. increasing novel ideas or composing relevant concept groups in inherent ideas or basic concepts. For instance, "making still further progress" and "keeping" improving" could be used for describing the elaborative performance (Pinjani & Prashant, 2013).

Research on Learning Organization and Organizational Communication

Boden et al. (2012) considered that an enterprise could promote job satisfaction by enhancing learning organization and change employees' attitudes and evaluation by encouraging constant learning and through learning culture and critical thinking. In this case, a learning organization could have the employees keep individual interaction and correct habits as well as enhance organizational communication to encourage employee morale and reduce absence rate and job rotation. Hong (2001) indicated that a learning organization could actually provide new styles for employees to facilitate good organizational communication, enhance job satisfaction, and relatively promote performance. As a result, it is assumed in this study that

H1: Learning organization shows positive and significant effects on organizational communication.

Research on Organizational Communication and Organizational Creativity

Ganjinia et al. (2014) discussed the relations between communication and creativity in service and manufacturing industries and revealed the effect of communication on creativity. Chung et al. (2012) stated that organizational communication could facilitate mutual understanding among employees, encourage job morale, enhance job satisfaction, and expect good creativity performance of employees. Martin & Beckmann (2013) mentioned that organizational communication mainly aimed to provide organizational members with necessary information at work and cultivate organizational members to present beneficial attitudes towards the organization and the organizational creativity so as to facilitate mutual coordination and enhance work creativity and individual satisfaction. Zukowski et al. (2012) pointed out the lack of effective communication as the major obstacle to organizational creativity. Chen et al. (2012) studied the effects of departments in Microsoft using internal networking on organizational performance and discovered that organizational members with higher satisfaction with communication could better enhance work performance and creativity. Black (2013) mentioned that an organization had to increase internal message communication; a decision-maker, when acquiring more adequate information, could make more beneficial decision quality on the organization so as to further enhance organizational creativity. Accordingly, it is assumed in this study that

H2: Organizational communication presents positive and remarkable effects on organizational creativity.

Research on Learning Organization and Organizational Creativity

Aslam et al. (2014) also pointed out a learning organization as an organization constantly learning and transforming. Learning was strategic and the process combined with tasks. Individual members, work teams, and the whole organization could participate in learning, which would result in the changes of knowledge, belief, and behavior and reinforce organizational capabilities of development and innovation. Zundert (2012) mentioned that a learning organization would transfer and share knowledge to have the organizational members getting rid of old thinking and learning mutually to become a creative organization encouraging the members presenting new thinking to enhance the corporate image as well as obtain precious talents. Apparently, a learning organization could form organizational creativity and change employees' work attitudes. Lars & Thomas (2012) indicated that changing the business behavior through learning organization to respond to the external environment could benefit organizational creativity as well as enhance work performance and employee satisfaction. Consequently, it is assumed in this study that

H3: Learning organization reveals positive effects on organizational creativity.

Table 1. Model fit analysis

Fit index	Allowable range	Research model	Model fit judgment
χ^2 (Chi-square)	The smaller the better	36.75	
χ^2 and degree of freedom ratio	<3	1.26	satisfied
GFI	>.9	0.96	satisfied
AGFI	>.8	0.89	satisfied
RMSEA	<.08	0.03	satisfied
CFI	>.9	0.92	satisfied
NFI	>.9	0.90	satisfied

SAMPLE AND INDICATOR

Research Sample and Object

Aiming at supervisors and employees of manufacturers in Weihai Torch Hi-Tech Science Park in Shandong Province, total 500 copies of questionnaire are distributed, and 376 valid copies are retrieved, with the retrieval rate 75%. Weihai Torch Hi-Tech Science Park, located in the west of Weihai City, is one of three national torch hi-tech industrial development zones established by Ministry of Science and Technology, Shandong provincial government, and Government of Weihai City. The hi-tech industrial parks are divided for Samsung, Gloway, Weigao, Wan Feng, Precision Printing, and Shuangfeng to form the high and new technology industry group of digital information, optical, mechanical and electronic integration, biomedicine, medical instruments, new materials, and marine biotechnology.

Reliability and Validity Test

Confirmatory Factor Analysis (CFA) is regarded an important part in SEM analysis. When proceeding CFA, the measurement model should be tested before the two-stage model modification to ensure the acceptable measurement model fit. In CFA in this study, the factor loadings of the dimensions appear in .62~.88, the component reliability is in .78~.90, and the average variance extracted shows .60~.70, conforming to the standards of Hair et al (2009) that 1.factor loading is larger than .5, 2.component reliability is larger than .6, and 3.average variance extracted is larger than .5. The dimensions therefore present convergent validity.

EMPIRICAL RESULT ANALYSIS

Structural Modeling Analysis

Structural modeling analysis contains research model fit analysis and overall model explanation power. For this reason, seven numerical indicators proposed by researchers are tested the overall model fit, including chi-square (χ^2), χ^2 and degree of freedom ratio, goodness-of-fit index, adjusted goodness-of-fit index, average approximate root mean square error, compared goodness-of-fit index, compared hypothesis model, and chi-square difference of independent model; the results are organized in **Table 1**.

Accordingly, χ^2 and degree of freedom ratio is used for testing the model fit, which is considered the smaller the better. The χ^2 and degree of freedom ratio in this study appears <3 (1.26); GFI and AGFI are better close to 1, but there is not an absolute standard to judge the model fit; and, GFI>.9 and AGFI>.8 are acceptable. This research model shows GFI and AGFI .96 and .89, respectively. A model is considered good and with reasonable fit when RMSEA appear between .05 and .08. RMSEA of this research model is .03. The allowance standard of CFI is >.90, and CFI of this study appears .92. NFI should at least be larger than .90, and NFI of this research model shows .90. Overall speaking, the goodness-of-fit indices conform to the standards, revealing that the research results are acceptable. The research samples therefore could be used for explaining the actual observed data.

From above overall model fit indices, the structured model and the observed data present favorable goodness-of-fit, showing that the theoretical model could thoroughly explain the observed data. In this case, the correlation coefficients and coefficient estimates of learning organization to organizational communication and organizational creativity could be further understood after testing the model fit.

The research data are organized in **Table 2**. The complete model analyses reveal that the five dimensions in learning organization (system thinking, personal mastery, mental model, shared vision, and team learning) present significant explanation on learning organization ($t>1.96$, $p<0.05$), the four dimensions in organizational communication (informatability, adjustability, persuasibility, and integrity) show significant explanation on

Table 2. Overall linear structural modeling analysis result

Evaluation item	Parameter/evaluation criteria	Result
preliminary goodness-of-fit	learning organization	system thinking 0.75*
		personal mastery 0.70*
		mental model 0.72*
		shared vision 0.81**
		team learning 0.78*
		informatability 0.82**
	organizational communication	adjustability 0.80**
		persuasibility 0.86**
		integrity 0.83**
	organizational creativity	fluency 0.89**
		flexibility 0.87**
		originality 0.85**
		elaboration 0.91**
Internal fit	learning organization→organizational communication	0.90**
	organizational communication→organizational creativity	0.89**
	learning organization→organizational creativity	0.92**

Remark: * stands for $p < 0.05$, ** for $p < 0.01$, and *** for $p < 0.001$

organizational communication ($t > 1.96$, $p < 0.05$), and four dimensions in organizational creativity (fluency, flexibility, originality, and elaboration) reveal significant explanation on organizational creativity ($t > 1.96$, $p < 0.05$). Apparently, the overall model in this study presents good preliminary fit.

Regarding the internal fit, learning organization presents positive and remarkable correlations with organizational communication (0.90, $p < 0.01$), organizational communication shows positive and notable correlations with organizational creativity (0.89, $p < 0.01$), and learning organization also reveals positive and significant correlations with organizational creativity (0.92, $p < 0.01$). H1, 2, and 3 are therefore supported.

CONCLUSION

The research result proves that learning organization could enhance employees' involvement and participation in job and could enhance organizational communication for employees promoting the organizational creativity. When becoming a learning organization, the learning organization characters could enhance organization internal members' identity to the job value. It is affirmed that high-Tech Industry could present better performance in the learning organization situation. This study also proves that high-Tech Industry with learning organization characters, when continuously learning, sharing experience and knowledge, and creating organizational value, could have the employees appear strong intention to maintain the relationship with the organization as well as identify the organization objectives and value to be willing to devote to the organization. In this case, the new atmosphere is created to better promote organizational performance; besides, integrating learning organization into job could result in distinct atmosphere for high-Tech Industry. Learning organization could bring precious human resources for high-Tech Industry. That is, high-Tech Industry could not neglect the charm of learning organization. As mentioned before, empowering employees is a factor in high performance. It would enhance employees' self-confidence and satisfaction when they consider that they could autonomously complete tasks. To present learning organization characters, managers in high-Tech Industry have to support learning, immediately respond to employees' problems and suggestions or feedback to employees' performance. Constant learning is also encouraged to change employee' attitudes & evaluation and different ideas or realization through learning culture and critical thinking, rather than simply deep-rooted ideas, on wok handling.

RECOMMENDATIONS

From the important results and findings, following practical suggestions are proposed.

1. High-Tech Industry are suggested in this study to provide employees with formal or informal learning opportunities. Learning organization in high-Tech Industry is a key factor. In the global economy and market competition nowadays, high-Tech Industry gradually present the model of learning organization. The requirements for work environment changes and individual self-realization also facilitate the emergence of learning organization. The continuous learning, if not from the aspect of informal employee learning, could utilize job rotation systems and teach employees to learn from work. It is correlated with work characteristics, which are a part of work design. When high-Tech Industry could utilize informal training, the employees' skills could be reinforced and trained to complete tasks.

2. High-Tech Industry must reinforce the internal organizational communication channels, mainly focusing on employees and supervisors at different levels in the organization. Formal and informal communication methods could be used for the communication with employees. Formal methods contain employee conference and management meeting; and, informal methods include private enquiry and the use of rumors. As a consequence, the judgment of individual communication ability becomes primary. Actively improving and following up the dimensions in individuals with worse communication ability could promote the overall organizational communication level.
3. High-Tech Industry must understand individual needs of employees to enhance organizational creativity. The major capital of high-Tech Industry is the internal members. In order to acquire competitive advantages, the cultivation of company members cannot be ignored. Employees in high-Tech Industry have longer working hours and sometimes have to work in shifts that the pay for employees should also be emphasized. Matching proper rewards and offering complete career planning could have employees present the same vision as the company to co-create the maximum benefits.

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