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A Study of the Influence of Learning Organization on Organizational Creativity and Organizational Communication in High Tech Technology

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ABSTRACT
The value of a high-tech industry no longer lies in the number of plants, equipment, and products but the intellectual property, customer confidence, capability of collaborating with business partners, telecommunication infrastructure, and the creativity potential and skills of its employees. This study is motivated by investigating the way of constructing an environmental atmosphere for employees to enjoy their works and create, learn, communicate, and share their knowledge for a high-tech industry. It is also expected to provide guidance for an employee to integrate his/her personal goal with the organization's so that he/she can keep contributing to the organization. The management levels and employees at the Weihai Huoju High-Tech Industrial Development Zone were selected as the research subjects in this study. A total of 500 questionnaire copies were dispatched and the number of valid questionnaire copies being returned was 376 with a rate of response as 75%. The results of this study are as follows. 1. The influence of a learning organization on organizational communications is positively significant. 2. The influence of organizational communications on organizational creativity is positively significant. 3. The influence of a learning organization on organizational creativity is positive. Conclusions and recommendations are proposed in study based on the research results with the expectation to turn a high tech industry into a learning organization and provide guidance for organizational communication and organizational creativity.
Keywords: high tech technology, learning organization, organizational communication, organizational creativity

INTRODUCTION

The trend in globalized competitions, the changes in consumption models, the innovations in production technologies, and the rapid developments in information technology have created a new arena for enterprises around the world to compete. Being confronted with the economic environment with rapid transitions, the competitive edges on which the high tech industry relied for their developments are vanishing gradually. Many of the traditional management paradigms are no longer suitable for the environment nowadays. The high tech industry needs to actively respond to the variations in the external environment and quickly respond to customer demands. Peter Drucker proposed that the next phase of our society

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State of the literature

- The high-tech industry has been facing the economic environment with fast transitions. The competitive edges that high-tech companies relied for their developments in the past are gradually disappearing.
- The investigations in this study are motivated by how a leader of a high tech industry/organization can construct an environmental atmosphere for employees to enjoy their works and create, learn, communicate, and share their knowledge for a high-tech industry.

Contribution to the literature

- A learning organization is a critical factor for a high tech industry. Nowadays, with the global economy and competitions in the markets, high tech industries are gradually aware of the existence of learning organizations.
- This deals mainly with the various levels of employees and the managements within the organization. The communication approaches can be classified into formal and informal ones.
- It is a non-negligible requirement to cultivate members in a company in order to gain competitive edges. Since an employee who works in the high tech industry has longer work time and sometimes needs to work on shifts, the pay received by an employee is equally important.

will be a knowledge society and the capital of the knowledge society is exactly the knowledge. Therefore, the new economy that is created in the 21st century is the knowledge economy. In the era of knowledge economy, the value of a high tech industry no long lies in the amount of factories, equipment, and products but the intellectual property, customer confidence, capability of collaborating with business partners, telecommunication infrastructure, and the creativity potential and skills of its employees. The largest resource for a high tech industry is the "third resource", which is the knowledge resource and is the highlight after resources such as capital and labor. An employee in the workplace needs to utilize new technologies with his/her active thinking and innovations so as to transform into the pattern of a knowledge worker.

The most valuable enterprises in the 21st century are also those with knowledge as their foundation. Moreover, knowledge workers have become the important assets for a high tech industry. The success of a high tech industry lies in the profits that are realized by products with high added values that are created by its talents with continuous learning of new knowledge. However, it doesn't necessary have good performance even if it has good employees. Particularly with the enhancement of employees' education background and levels of expectation, an administrator needs to excite his/her employees and enhance their job satisfaction via his/her leadership and the construction of open and flexible work environment. The investigations in this study are motivated by how a leader of a high tech industry/organization can construct an environmental atmosphere for employees to enjoy their works and create, learn, communicate, and share their knowledge for a high-tech

industry. It is also expected to provide guidance for an employee to integrate his/her personal goal with the organization's so that he/she can keep contributing to the organization.

LITERATURES AND HYPOTHESIS

Learning organization

Khosravi & Ahmad (2013) proposed that a learning organization is an organization that integrates knowledge management, intellectual asset management, innovation, organizational learning, personal learning, and information technology. It is also an organization that keeps pushing itself and enterprise members to learn and transform (Atalay et al., 2012). It represents an approach of change management, which especially emphasizes on the way of enhancing employee values, decision sharing, and constructing a learning community so as to push an employee to contribute to his/her work and organization (Lee, 2012). An organization needs to adopt the way of continuously changing, adapting, developing, and learning so that it can adapt to the environment by organizational learning, revolutions, and innovations (Cheung et al., 2013). Liu & Li (2012) proposed that a learning organization should stress sharing, mutual learning between members in the organization, and active searching for internal and external information. It should also learn together with its suppliers and customers so as to create values and gain the competitive edge. Furthermore, Boden et al. (2012) proposed that a learning organization can make the learning, adapting, and changing capabilities deeply rooted into the organizational culture. It also emphasizes information sharing so that members in the organization can learn from each other and the employees can be trained in a more effective approach. The organization's competitive edge can be obtained by information technology, knowledge, and the construction of work teams (Agarwal et al., 2012). A learning organization is an ideal organizational pattern, which is capable of carrying out more effective learning so as to boost the prosperity and developments of the organization (Nazar, 2013). It is also an organization that can authorize employees and enhance the employees' commitments to the organization and reduce the reliance on bureaucratic controls (Yazici, 2012). Ganjinia et al. (2014) proposed that a learning organization allows its members to continuously scale up their capabilities and create the really satisfying results. It also allows the nurturing of new patterns of thinking approach so that a shared vision can be realized. Moreover, its members can learn continuously the way of educating each other so as to set the foundation for success up.

In this study, we referred to the five constituent elements of a learning organization as proposed by Cheng & Fu (2013) and they are described respectively as follows.

(1) System thinking: System thinking deals with resolving the issues of an organization. It is required to get rid of dogmatic and segmented way of thinking and use an integral view to observe the recirculating factors and interactions between the occurrences of different events. It is also required to observe the process of a succession of organizational issues rather than

segmented individual events. This is to avoid neglecting the integrity of the issues for an immediate solution to the issues.

(2) Personal mastery: Personal mastery deals with cultivating a members' acceptance for self-challenging so as to identify his/her target to achieve and does his/her level best with full concentration. When facing a scenario with frustrations, the defeated and nervous mood is exactly the source for triggering the member's personal creativity. It will be easier for a member to succeed if he/she can overcome the emotional response to back down and make appropriate reflections, adjustments, and corrections.

(3) Mental model: The creed of a traditional bureaucratic organization is to emphasize management, organization, and controls. However, a learning organization has different belief, vision, values, and mental model. It highlights that the only way to trigger the group's wisdom and build consensus during the process of exchanging opinions and action implementations is by encouraging the members in the organization to improve their mental models.

(4) Shared vision: Building a shared vision is a process of bottom-up communications within an organization. Building a vision has its advanced indicators and is a mission that is never ending.

(5)Team learning: The key to the construction of team learning depends on the members' capabilities of dialogues and discussions with an organization. This type of dialogues emphasizes using the principle of seeking differences from a common ground in order to explore the truth. A member in the organization can face the obstruction of his/her thinking squarely via dialogues and further fact the facts and learn to appreciate different opinions so as to form a higher level of consensus.

Organizational communication

Black (2013) indicated that "Communications in an organization is to supply messages, enhance the mutual understanding between employees and inspire their work emotions, enhance their work satisfaction, and expect them to have favorable work performance". Martin & Beckmann (2013) proposed that communication is a dynamic course, which includes several elements such as a sender, receiver (a person or a group), medium (language or non-language), message (opinion, concept, attitude, thinking, knowledge, information, etc.). Moreover, it is systemized and includes source, news, channel, reception, and feedback. The sender and the receiver of communication could be the same person and could be one or several groups. They understand each other, build consensus, and reach the goal via various types of communication media, tools, languages, symbols, or channels. Al-Busaidi & Kamla (2013) proposed that organizational communication is a generalized concept, which includes the exchanges between messages that are internal and external to an organization. Jarrahi & Sawyer (2013) proposed that "Organizational communication is any course for a specific member in an organization to convey his/her decision premise to another member". Chung et al. (2012) proposed that "Organizational communication

indicates the messages sent and received for a member in an organization to achieve the goal set for the organization on the role in his/her job. The operations of organizational communications are to achieve a goal via the communication network within the organization". According to Klitmoller & Lauring (2013), 85% of the success of a person on his/her job depends on whether he/she can communicate with others effectively. For an organization, a successful organization needs to allow the communications between people at different levels and in different departments so as to ensure they carry out their tasks effectively.

In this study, we refer to the study by Chen et al. (2012) that organizational communication has four constituent elements as follows.

(1) Informativeness: The supply of information required by a member on his/her work.

(2) Adjustability: The guidance of a member's behaviors to facilitate the operations of the organization.

(3) Persuasiveness: Persuading a member to comply with the intent of an organization.

(4) Integrity: The integration of the actions and operations between members or departments.

Organizational creativity

Elenurm(2012) gave a direct definition of organizational creativity as follows. Via the application of creativity during the operations within an organization, the organization can better face the transitions in the environment. Keller & Yeaple (2012) proposed that organizational creativity deals with the valuable and usable new products, services, ideas, programs, or procedures that are created by a person in the complicated social system. Aslam et al. (2014) proposed that organizational creativity is of multiple aspects and it is not limited to inventing products, but also include the creativity of new management systems. For example, improving the way of working and creating new functions are all performance of creativity. Lars & Thomas (2012) proposed that organizational creativity is the capability of an organization to pursue for revolutions and to create new objects. It is obtained by a person with creative potentials to generate innovative results by utilizing creative thinking and carrying out creation behaviors continuously with the supports and encourages by the organizational systems. It is expected that the organization can cope with the challenges from the environment well, maintain its competitive advantage, and further master the winds of change so as to become a forward-looking organization. Blome et al. (2014) proposed that a collaboration-oriented organizational culture can reduce the factors that hinder its creativity. It allows members in the organization to propose new concepts and ideas in a free and open environment so as t to reduce the feeling of anxiety when a member is proposing his/her ideas. Lin et al. (2012) proposed that organizational creativity is affected by technical factors, group characteristics, organizational characteristics and systems, and social cultural features.

In this study, we refer to the research by Chen & Cheng (2012) that creations are the transformation processes that keep an individual or population moving forward along with the presentation of awareness, emotion, and meaning like never before. The result of this presentation upgrades itself, the individual, or the field being created into a higher level of transformation era. Creativity usually includes several fundamental perception capabilities of divergent thinking. These capabilities can be understood by examination tools or the observation by people who carry out evaluations. They are described respectively as follows (Nagati & Rebolledo, 2014).

(1) Fluency: Fluency indicates the amount of concepts that are generated by a person. It is the capability of proposing many different possible solutions for a problem or the capability of resolving the problem. If a student can propose various responses during the stage of concept generation, this indicates his/her thinking is equipped with fluency (Pinjani & Prashant, 2013).

(2) Flexibility: Flexibility indicates the capability of a person to change the way of his/her thinking. When a problem occurs, he/she can think in a different way and find different application scopes or new concepts. In other words, he/she can adapt to various types of conditions without viewing a problem in an inveterate and dogmatic thinking. The embodied performances of flexibility include "any circumstance hitting a limit will begin to change and change will in turn lead to an unimpeded state", "being quick on the uptake", or "comprehension by analogy".

(3) Originality: Originality indicates a person's capability of coming up with unique and novel ideas. It is the capability of doing something that others cannot expect or generating different points of view than others. Even if a person gets the same stimulus as others, he/she can come up with ideas different from others. A person has a higher degree of originality if he/she is less similar to others.

(4) Elaboration: Elaboration is a type of complementary concept. It indicates the capability of a person to add new concepts to an original idea. It deals with the capability of adding novel ideas or composing relevant concept groups to inherent ideas or fundamental concepts. For example, "going further and reaching even higher levels of success" and "striving for excellence" can both be used to describe the performance of elaboration (Pinjani & Prashant, 2013).

Studies that are related to learning organizations and organizational communications

Boden et al. (2012) proposed that an enterprise can enhance its employees' work satisfaction by promoting the implementation of learning organization. Moreover, the evaluation of employees' attitude can be enhanced by encouraging a continuous learning culture and critical thinking. Furthermore, a learning organization allows an employee to keep personal interaction relationships and correct habits so that organizational communications are enhanced in order to encourage the morale of employees and reduce the absence rate and job

switchover. The study by Hong (2001) indicated that a company with learning organizations can indeed bring a new atmosphere to the employees and keep good organizational communications so that job satisfaction is enhanced and performance is enhanced comparably. Therefore, the hypothesis in this study is as follows.

H1: The influence of a learning organization on organizational communications is significantly positive.

Studies related to organizational communications and organizational creativity

Ganjinia et al. (2014) investigated the relationship of communications and creativity respectively for the service industry and the manufacturing industry. The empirical results indicated that communications do affect creativity. Chung et al. (2012) proposed that organizational communications is to boost the mutual understanding between employees, raise their work emotions up, and enhance job satisfaction with the expectation to see good creativity presentations by an employee. Martin & Beckmann (2013) proposed that the main objective of organizational communications is not only to supply the information required for an organization's members on their jobs, but also to cultivate members to generate beneficial attitudes toward the organization and the organizational creativity so as to boost the coordination between each other and boost their work creativity and personal satisfaction. Zukowski et al. (2012) indicated that lacking effective communications is the major hurdle that restrains organizational creativity for an organization. From their study on the influence of internal networks on organizational performance for various departments within Microsoft, Chen et al. (2012) discovered that a higher degree of communication satisfaction between the members in an organization can better enhance work performance and creativity. Black (2013) proposed that an organization needs to enhance the communication of internal messages. A decision-maker can make more beneficial and better-quality decisions for his/her organization if he/she gets more sufficient information. This way, the organizational creativity can be further enhanced. Therefore, the hypothesis in this study is as follows.

H2: The influence of organizational communications on organizational creativity is significantly positive

Studies related to learning organizations and organizational creativity

Aslam et al. (2014) also proposed that a learning organization is a type of organization that keeps learning and transforming. This type of learning is a strategic process that is integrated into works so that from the individual member and the work team to the whole organization all participate into the learning. The result of learning will trigger the changes of knowledge, beliefs, and behaviors and strengthen the organization's capabilities of growth and innovations. Zundert (2012) proposed that a learning organization can transfer and share knowledge so that the members within this organization can trip their only thinking and learn from each other. By turning into an organization with creativity and encouraging its members to generate new thinking, the corporate image can be enhanced and valuable

talents can be kept. It is obvious that a learning organization is capable of bring creativity to an organization and changing the altitude of employees. Lars & Thomas (2012) indicated that changing an organization's management behaviors by the learning organization in order to respond to the external environment not only is beneficial of affecting the organization's creativity, but also can enhance its work performance and employee satisfaction. Therefore, the hypothesis in this study is as follows.

H3: The influence of a learning organization on organizational creativity is positive.

SAMPLES AND EVALUATION INDICATORS

Research samples and objects

The management levels and employees at the Weihai Huoju High-Tech Industrial Development Zone were selected as the research subjects in this study. A total of 500 questionnaire copies were dispatched and the number of valid questionnaire copies being returned was 376 with a rate of response as 75%. Weihai Huoju High-Tech Industrial Development Zone is called High Zone in short. It is located at the west portion of Weihai's urban area. It is one of the three national Huoju high-tech industrial development zones in China. It was founded jointly by the Ministry of Science and Technology, Shandong Province Government, and Weihai City Government. There are Samsung, Guangwei, Wego, Precision Printing, Manfung, and Shuangfeng high-tech industrial parts and they have formed high-tech industrial groups including electronics information, opto-mechatronics integration, biomedical, medical appliances, new materials, and ocean biotechnology.

Examination of reliability and validity

When carrying out the SEM analysis, a critical step of it is the Confirmatory Factor Analysis (CFA). Therefore, when carrying out the CFA measurement model in this study, we conducted two-step model corrections during the evaluation of the structural model. It is required to examine the measurement model in advance and then conduct the SEM model evaluation in the second step if the goodness-of-fit of this measurement model is found to be acceptable. The results of the CFA analysis of various constituent elements in this study indicated that, the factor loading of the constituent elements of the model is between .62~.88. The composite reliability is between .78~.90 and the average variance extracted is between .60~.70, which complies with the criteria proposed by Hair, Babin, Anderson, Tatham, and Black (2009) as follows. 1. Factor loading is larger than .5; 2. Composite reliability is larger than .6; 3. Average variance extracted is larger than .5. Therefore, the constituent elements are provided with convergent validity.

ANALYSIS OF THE EMPIRICAL RESULTS

Analysis of the structural model

The analysis of the structural model includes the analysis of the goodness-of-fit for the research model and the explanatory capacity of the overall research model. Therefore, we

referred to the opinions of various scholars and carried out the examination of goodness-of-fit of the overall model by seven numerical indicators, which include the examination of chi-square value ($\chi 2$), the ratio of $\chi 2$ to the degree of freedom, goodness-of-fit index, goodness-of-fit index after adjustment, root mean square error of average approximation, comparative fit index, comparative hypothesis model, chi-square difference of the independent model. The overall results are summarized into Table 1 as follows.

According to the aforementioned description, $\chi 2$ and its degree of freedom were used to examine the goodness-of-fit of the model. Typically, a smaller ratio is better. The ratio of$\chi 2$ and the degree of freedom is < 3 (1.26) for this research model. It is better to have the values of GFI and AGFI as closer to 1 as possible. There is no absolute criterion to determine the goodness-of-fit of this model and it is acceptable only with a combination of GFI > .9 and AGFI > .8. The GFI and AGFI are respectively .96 and .89 for this research model. If RMSEA is between .05 and .08, it indicates the model is good and it has a reasonable fit. The RMSEA of this research model is .03. The acceptable criterion for CFI is > .90 and the CFI of this research model is .92. The NFI needs to be larger than .90 and the NFI of this research model is .90. In general, the goodness-of-fit indicators comply with the standard values and this indicated the research result is an acceptable model. Therefore, the sample data obtained in this study can be used to explain the data obtained from practical observations.

If viewed form the above goodness-of-fit indicators, there is a good goodness-of-fit in general between the model framed by this structure and the observed data. This indicated the theoretical model can sufficiently explain the observed data. Therefore, after the examination of the model's goodness-of-fit, we can further understand the correlation coefficients and estimated coefficients for a learning organization on organizational communications and organizational creativity.

Table 1. Analysis of goodness-of-fit for this research model

Fit Indices	Acceptable range	In this research model	Determination of goodness-of-fit
$\chi 2$ (Chi-square)	Smaller is better	36.75	
Ratio between $\chi 2$ and the degree of freedom	<3	1.26	OK
GFI	>.9	0.96	OK
AGFI	>.8	0.89	OK
RMSEA	<.08	0.03	OK
CFI	>.9	0.92	OK
NFI	>.9	0.90	OK

The resulting data of this research is summarized in Table 2. The results obtained from the complete model indicated that the values explained of those five constituent elements (system thinking, personal mastery, mental model, shared vision, and team learning) for a learning organization all reached the significant level ($t>1.96$, $p<0.05$). For the values explained of those four constituent elements (Informativeness, adjustability, persuasiveness,

and integrity) for organization communications all reached the significant level ($t>1.96$, $p<0.05$). For the values explained for those four constituent elements (fluency, flexibility, originality, and elaboration) for organizational creativity all reached the significant level ($t>1.96$, $p<0.05$). It is known from this result that the overall model of this study has a good simple goodness-of-fit. For the internal goodness-of-fit, there is a significantly positive correlation between a learning organization and organization communications (0.90, $p<0.01$). There is also a significantly positive correlation between organizational communications and organizational creativity (0.89, $p<0.01$). There is also a significantly positive correlation between a learning organization of organizational creativity (0.92, $p<0.01$). These results indicated that Hypotheses 1, 2, and 3 are all supported.

Table 2. Results of the analysis of the overall linear structural model

Evaluation item	Parameters / Evaluation criteria		Results
Basic 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*
	Organizational communication	Informativeness	0.82**
		Adjustability	0.80**
		Persuasiveness	0.86**
		Integrity	0.83**
	Organizational creativity	Fluency	0.89**
		Flexibility	0.87**
		Originality	0.85**
		Elaboration	0.91**
Internal goodness-of-fit	Learning structure → Organizational communication		0.90**
	Organization communication → Organizational creativity		0.89**
	Learning structure → Organizational creativity		0.92**

Notes: * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$.

CONCLUSIONS

The results of this study indicated that, a learning organization not only can enhance its employees' devotion and feeling of participation into their work, but also can further enhance organizational communications so as to achieve the enhancement of organizational creativity by its employees. To become a company with learning organizations, it is required to own the characteristics of a learning organization so as to allow the internal members in an organization to enhance their work values and generate the sense of recognition. In the high tech industry, will an employee present better working performance if he/she is working in a learning-organization scenario? The answer is definitely positive. It was also verified in this study that an employee will have strong willingness to maintain good relationships within his/her organization if a high tech industry is equipped with the

characteristics of a learning organization such as continuous learning, sharing experiences and knowledge, and creating organizational values. An employee can also recognize the organizational targets and values and is willing to devote more efforts into his/her organization. This way, he/she can bring a new atmosphere to his/her organization and can enhance the performance of this organization. The integration of a learning organization into works can also bring a different atmosphere to the high tech industry. A learning organization can bring valuable human resources to a high tech industry. This means a high tech industry should not underestimate the charisma of a learning organization. As mentioned above, authorizing employees is one of the factors to high performance. An employee believes in completing a task by his/her own independently and this approach enhances not only his/her self-confidence but also his/her satisfaction. To get a company equipped with the characteristics of a learning organization, one of the emphases is the support from the managements of a high tech industry to respond immediately to employees' questions or recommendations or feedbacks to the good performance of employees. They should also encourage continuous learning since an employee's attitude and evaluation of things can be changed via the learning culture and critical thinking. An employee will have different ideas or realizations of the handling of his/her work and will no longer have ingrained concepts only.

RECOMMENDATIONS

The important results and discoveries of this study are summarized in this section and the following recommendations are proposed based on the practicability of the research results.

1. We recommend a high tech industry to provide its employees with formal or informal learning opportunities. A learning organization is a critical factor for a high tech industry. Nowadays, with the global economy and competitions in the markets, high tech industries are gradually aware of the existence of learning organizations. The changes in the work environments and the demands of personal self-realization also cause the creation of learning organizations. For the learning informal employees, the so-called continuous learning can be realized by the job switchover system so as to educate employees to learn from their work. This is connected to job characteristics which are also part of the job designs. A high tech industry can also utilize informal training to strengthen the skills of its employees and carry out training to get them complete the entire mission.

2. A high tech industry needs to strengthen the communications for its internal organizations. This deals mainly with the various levels of employees and the managements within the organization. The communication approaches can be classified into formal and informal ones. The formal approaches include staff meetings and management meetings. The informal approaches include querying privately and the utilization of hearsays so as to achieve the objective of communication with employees. The evaluation of personal communication skills is very important. For the constituent members who have worse

communication skills within an organization, it is required to carry out improvements and follow-ups so that the communication quality of the overall organization can be enhanced.

3. A high tech industry needs to understand the personal demands of its employees so as to enhance organizational creativity. The largest capital for a high tech industry is its internal members. It is a non-negligible requirement to cultivate members in a company in order to gain competitive edges. Since an employee who works in the high tech industry has longer work time and sometimes needs to work on shifts, the pay received by an employee is equally important. Adequate rewards and consummate career planning make an employee generate the same vision for the company so that they are willing to work together to create the largest benefit.

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