# The Impact of Human Resource Development on Continuous Improvement in the Steel Industry

Chanakan Chavaha*
Rajamangala University of Technology Thanyaburi

Chanongkorn Kuntonbutr, Assoc. Prof. Dr.
Rajamangala University of Technology Thanyaburi

Review of Integrative Business & Economics Research

**ABSTRACT**

This study aims to examine the influence of utilizing human resource development (HRD) on continuous improvement (CI) in employee performance in the steel industry. The sample is composed of employees from the steel industry. The data were collected by questionnaires and then calculated following the rule of structural equation model. Results indicated a positive influence of the implementation of the model. The ability of employees could be improved by HRD and CI practices, such as people learning from their positive and negative experiences, individuals searching opportunities for learning/personal development, individuals and groups at all levels sharing their learning from all work experiences, managers accepting and acting on all the learning that occurs when necessary, and designated individuals using organizational mechanisms to deploy the learning that is captured across the organization. These initiatives could increase the ability of all employees.

Keywords: human resource development, continuous improvement, steel industry, HRD, CI, employee

## 1.1 INTRODUCTION

Nowadays, every organization invests in a large variety of human resources as high-value organizational capitals. Human resource is regarded as human capital or intellectual capital and is significant to an economic system. Given that every organization requires competent workers, it should essentially fully utilize the advantages of its human resources. The organization must possess highly competent personnel to build a competitive advantage. Therefore, personnel must be developed continuously and systematically. Training and development must include explicit planning and must be substantially managed. In particular, personnel must understand the working proficiency and communication between superiors and subordinates within the organization. Furthermore, they must learn how to use the equipment, machines, work appliances, and new technologies. They must also recognize how to utilize the continuous improvement (CI) system for improving their work. Such a


ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

system will solve work-related difficulties, detect work-related errors, and produce high-quality work. Thus, an organization should train its personnel to reap the benefits of appropriate and quality personnel. Personnel characteristics should include being knowledgeable, creative, and willing to perform high-quality work. Meanwhile, management executives need to place equal importance on different groups of people within the organization. Otherwise, they will be impartial in allocating compensation, benefits, services, and occupational opportunities and in achieving work performance quality. Incidentally, the organization should recognize the significance of building a positive work environment and encourage employees to devote themselves to their organization. In addition, the organization should focus on its management team, which can assist in building a cooperative employee group. This cooperation can contribute to the fostering of a learning organization in which everyone understands the advantages and disadvantages of reciprocity. This realization can solve work-related problems and build competitive advantages for the organization.

The current world economic circumstances require the utilization of domestic austerity, especially in large economy countries, such as the United States of America and European countries. This factor necessitates a strict monetary policy and the payment reduction in each country. Thus, the governments must assist in maintaining the economic stability of their country. Manufacturing, trading, and exchanging products in a market will flow if the economic circumstances facilitate the trade and if the manufacturing resources are utilized completely. If every factor of production is completely utilized, then full employment can be assured. The levels of product prices will also insignificantly increase. In addition, the country will obtain the possible highest income and with profits extending across cities. The steel industry is a basic industry and is significant for all developing countries in the world. The industry involves many machines and employees for production and export of its products; therefore, this industry requires high standards of working because of its connection with numerous influential industries, such as automotive, electrical appliances, electronics, furniture, canned food (package), machinery, and construction. For economic stimulation, the government ministry plans to invest in the steel industry, specifically in transportation projects. Employees with high knowledge and ability to work in the industry will continue to be employed. Many organizations have succeeded in their business model because of the strategies and abilities utilized by their employees. Companies will manage by using low-cost strategies, such as CI. Competitive advantage is an important aspect to consider when employing staff of high ability. Qualities that many companies are seeking are employee commitment, staff morale, and work demands.


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## 2.1 LITERATURE REVIEW

### 2.1.1 HUMAN RESOURCE DEVELOPMENT (HRD)

Amartya Sen (1999), the 1998 Nobel Laureate in Economic Sciences, described the term "development" as a process of stepping into the real human freedoms in his book *Development as Freedom*. The process involves an increase in gross national product, an improvement in personal income, a revolution in the industrial society, and an innovation in technological breakthrough. Amartya Sen considered that these involvements are tools or media of freedom expansion for everyone in the society to follow his or her desires. However, those freedoms rely on other related variables or determinants, such as resource allocation, regulation promulgation, or social organization, political system, and human rights issues. Therefore, if freedoms indicate advancement in development, then development will be the terminal objective to place the importance on the human rights and freedoms everyone desires.

Craig (1976, cited in Weinberger, 1998) stated that HRD is an activity that focuses on the central position of a human's potential development in every dimension of his or her lifetime.

Jones (1981, cited in Weinberger, 1998) described HRD as a systematic extension of human competencies in work performance conforming to personal and organizational requirements.

R. Smith (1998, cited in Weinberger, 1998) explained that HRD consists of projects and activities held directly and indirectly to increase personal and organizational productivities and profits.

According to Nadler's (1970) concept of HRD, the themes of HRD activities must conform to the main purpose of the concepts requiring developments as follows:

1. Job refers to a current or a present job of an individual. It pairs with training, an arrangement of learning activities in various themes. The training aims to enhance employees' readiness for their work. Examples of training are the theoretical training held in a lecture room, on-the-job training, and distance training.
2. Individual refers to personal development through a learning activity within the theme of education. This education assists all personnel in learning and preparing for their desired future careers. Consequently, they can prepare for future jobs or new positions and can be progressive in their job positions.
3. Organization development refers to good performance and sustainable growth of organizations. The concept of HRD focusing on organizations is utilized for


ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

assisting them to prepare for any circumstance. Nadler (1970) used the words "organization development" and "development" to explain the phrase "individual development." Individual development is an arrangement of an individual's learning activities, training, and education. Thus, "development" in this definition refers to personal development that does not only emphasize present and future careers but also learning for general advancement. Examples of these advancements are knowledge, skills, attitudes reflecting individual wisdom, and proficiencies at work and in private life.

Gilley, Eggland, and Maycunich Gilley (1989, 2002) proposed a concept of HRD with three overlapping main parts. The first part is individual development covering Nadler's (1970) concepts of development through education, training, and self-learning in various ways. The second part is career development, which emphasizes personal advancement in a long-term career. The last part is organization development, which emphasizes the development and adaptation processes of an organization. These processes can assist the organization in adapting to internal and external transformation. This notion conforms to Nadler's concepts in Figure 1.1.

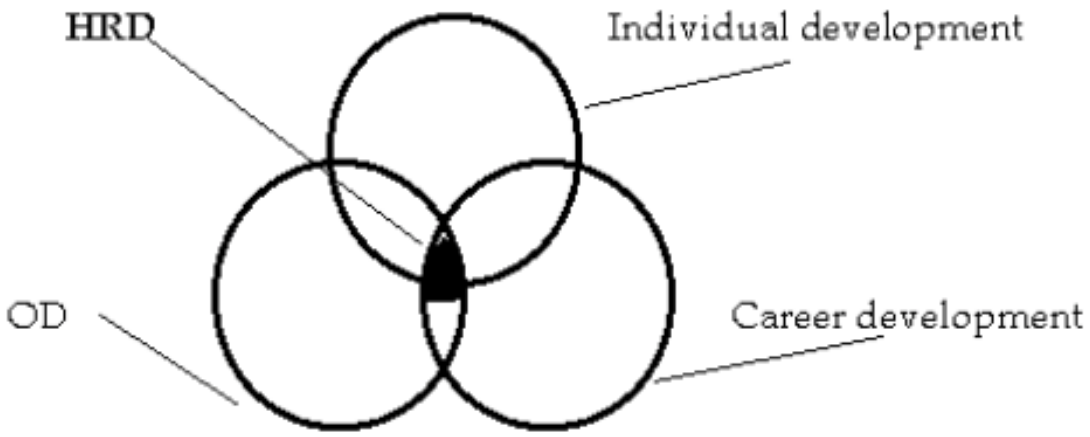


Figure 1.1 Concepts of HRD (Gilley et al., 1989)

Consequently, a concept that included career development for an entire organization was proposed in 2002. The concept is termed performance management to be utilized for increasing overall efficiency of personnel performance over time. In 2002, Gilley et al. added roles and practices that cover short- and long-term contributions. These roles and practices emphasize four dimensions of the individual and the organization. In 1989, Gilley et al. further added one dimension based on three proposed components, as shown in Figure 1.2.


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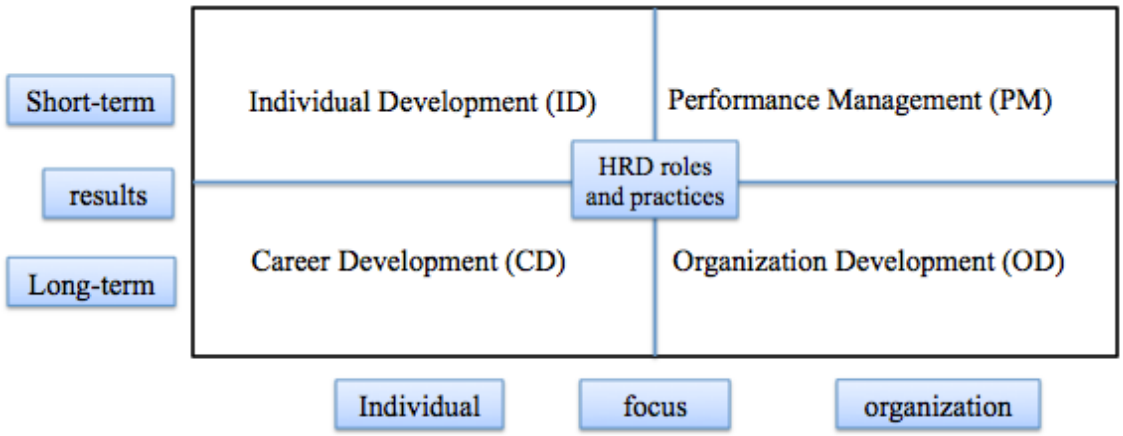


Figure 1.2 Model of HRD )Gilley et al., 2002(

### 2.2.2 CONTINUOUS IMPROVEMENT (CI)

CI is a concept that is efficiently utilized in administration and management. This notion emphasizes the participation of each employee in searching for a new approach to regularly enhance work performance and work environment. The keys to CI are maintaining the good and developing it continuously.

Gao (2011, p.12) introduced CI or "Kaizen" in the Japanese language. The significance of the Kaizen process is to utilize employees' knowledge and capacities in performance improvement through minimal investment. In this case, a minimal improvement increases gradually and continuously. However, the Kaizen process is contrary to innovation. Specifically, innovation is a significant change that utilizes highly complex technologies, including massive investment funds. By contrast, Kaizen can be utilized for improvement regardless of the economic circumstances.

Jorgensen et al. (2006, p.329) defined the five stages of maturity in the CI model (based on Bessant & Caffyn, 1997; Caffyn, 1999) as follows: 1) Natural/background CI, in which no formal CI structure exists and problem solving is random and conducted by specialists. 2) Structured CI, in which formal attempts to create and sustain CI exist and a formal problem-solving process is used and supported by basic CI tools. CI is also often parallel to operations. 3) Goal-oriented CI, in which formal deployment of strategic goals and monitoring and measurement of CI against these goals are also present apart from the two above-mentioned stages. 4) Proactive/empowered CI, in which the responsibility for CI is devolved to the problem-solving units in addition to the three above-mentioned stages. 5) Full CI (the learning organization), in which everyone in the organization is involved and learning is automatically captured and shared. Additional details of these stages are discussed


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below.

In Level 1 or natural/background CI, no consistent, professional standard for problem solving exists within the workplace. Formal support is lacking, and the management typically controls the solutions. Employees are not solution based when confronted with problems. In Level 2 or structured CI, the CI initiative begins. The industry implements new structures and patterns to allow staff participation in the problem-solving process. The staff members are aware of their function within the company as they are trained with CI tools. In Level 3 or goal-oriented CI, the company further implements the CI model. Thus, formal development helps create a strong company within. Goals, behaviors, and concerns are addressed in this stage. An approach to stabilize and create solutions toward these goals is established and maintained. The staff members are encouraged to participate in activities that strengthen their problem-solving abilities. In Level 4 or proactive/empowered CI, the staff members become highly integrated in the new system. Thus, they are encouraged to have high independence as large numbers of responsibilities are delegated. The management allows the staff to work through problems within groups or individually as a way to share authority, thereby empowering each employee. This level allows experimentation to form as a way to create experience through trial and error. In Level 5 or full CI, the goals and behavioral standards are already established and the staff members are aware of their function and work with independence. The CI model is fully implemented, and the company sees major positive results. Experimentation still occurs as a way for employees to practice their autonomy. Employees are trained to have an automatic response in solving problems. They can function without the control of the management. Given this much responsibility, employees are held to high ethical standards and should practice integrity throughout each decision-making process. Companies can build much trust within their staff; therefore, work performance and ethics will improve. CI ability must be used many times to achieve full CI benefits in an organization. When the organization uses CI strategy, the employees' behavior becomes routine that the organization acquires the following learning: 1) People learn from their positive and negative experiences. 2) Individuals search opportunities for learning or practice personal development (e.g., actively experimenting and setting their own learning objectives). 3) Individual and groups at all levels share (make available) their learning from all work experiences. 4) The organization articulates and consolidates (captures and shares) the learning of individuals and groups. 5) Managers accept and act on all the learning that occurs when necessary. 6) People and team ensure that their learning is captured by utilizing the mechanisms provided for doing so. 7) Designated individuals use organizational mechanisms to deploy the learning that is captured across the organization.


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### 3.1 RESEARCH METHODOLOGY

The study aimed to examine the influence of utilizing HRD on CI in employee performance in the steel industry. This study hypothesized that HRD would positively affect CI. Data sources could be divided into two types, primary and secondary, both of which were employed within the CI research. Primary data were those that had to be collected for the first time by the investigator though observation, whereas secondary data included pre-existing information gathered by someone else for the purpose of the study. These data might be internal or external to the investigated organizations. The current researcher required a sample composed of 250 people from the steel industry. The analysis of CI practices in the steel industry found a positive influence of the implementation of the model. The data were collected by questionnaires and were then calculated following the rule of structural equation model (SEM). CI was used as the dependent variable of the model. Obtaining observed variables for measurement was difficult owing to the wide variety of concepts and definitions of goal within the steel industry. Variables used for this study were the following aspects: people learn from their positive and negative experiences, individuals search opportunities for learning/personal development, individual and groups at all levels share (make available) their learning from all work experiences, managers accept and act on all the learning that occurs when necessary, and designated individuals use organizational mechanisms to deploy the learning that is captured across the organization. All these aspects of employee performance in the steel industry have been thoroughly reviewed in previous relevant studies and have represented good measurement for CI construct. The current research employed primary data collected form the steel industry to test the conceptual model. The conceptual model is shown in Figure 3.1.

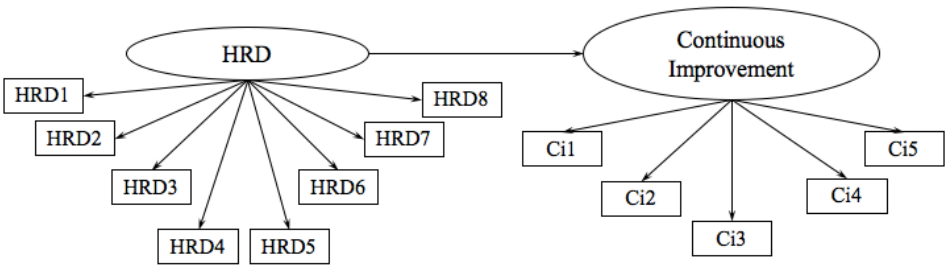


Figure 3.1 Conceptual Model


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### 3.1.1 Data Coding and Entry

The variables in this study were encoded to simplify the data processing and interpretation process. The abbreviations used for all the variables are shown in Table 3.1. IBM's statistical software packages were used for data analysis. SPSS Statistics version 20 was used for descriptive statistics, and SPSS Amos version 23 was used for SEM analysis.

**Table 3.1** Abbreviation of constructs and observed variables

| Construct | Observed variable |
|---|---|
| Human resource Development (HRD) | Formal Education (HR1) |
| | Assessment (HR2) |
| | Job experiences (HR3) |
| | Interpersonal relationship (HR4) |
| | Career counseling by supervisor (HR5) |
| | Employees' spend time (HR6) |
| | Employees' used information (HR7) |
| | Engagement in developmental activities (HR8) |
| Continuous Improvement (CI) | Employees' experiences (CI1) |
| | Employees' opportunities (CI2) |
| | Employees' feelings (CI3) |


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Managers' acceptance (CI4)

Appropriate organizational activities (CI5)

### 3.2 Demographic Data

Questionnaires were sent to the research sample composed of employees in the steel industry. The questions included five demographical aspects: gender, age, education, work experience, and monthly salary. The summarized of demographic shown in Table 3.2

**Table 3.2** Demographic summary

| | Frequency | Percentage |
|---|---|---|
| **Gender** | | |
| Male | 137 | 54.8 |
| Female | 113 | 45.2 |
| **Age** | | |
| Below 25 | 10 | 4.0 |
| 25–35 | 100 | 40.0 |
| 36–45 | 88 | 35.2 |
| 46–55 | 42 | 16.8 |
| above 55 | 10 | 4.0 |
| **Education Background** | | |
| Lower high school degree | 9 | 3.6 |
| High school degree with vocational and technical certificate | 82 | 32.8 |
| Bachelor degree with high vocational and technical certificate | 152 | 60.8 |
| Upper bachelor degree | 7 | 2.8 |
| **Work experience** | | |
| Less than 3 years | 37 | 14.8 |
| 3–5 years | 69 | 27.6 |
| 6–10 years | 64 | 25.6 |
| More than 10 years | 80 | 32.0 |
| **Monthly salary** | | |
| Less than 10,000 TBH | 16 | 6.4 |


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| | | |
|---|---|---|
| 10,000–20,000 TBH | 122 | 48.8 |
| 20,000–30,000 TBH | 65 | 26.0 |
| More than 30,000 TBH | 47 | 18.8 |

The demographic data from respondents were classified into personal profile. The personal profile composed of gender, age group, educational background, work experience, and monthly salary. With regard to gender, the majority of the respondents were male at nearly 54.8% and the remaining respondents were female at 45.2%. In terms of age group, most respondents were 25–35 years old at 40.0%, followed by the age group of 36–45 years old at 35.2% and the age group of 46–55 years old at 16.8%. The age group of over 55 years old and the age group of less than 25 years old were at the same percentage at 4.0%. As for the educational background, respondents with bachelor degree and high technical certificate were the largest group at 60.8%, followed by those with high school degree and technical certificate at 32.8%, those with lower high school degree at 3.6%, and those with upper bachelor degree at 2.8%. In the aspect of working experiences in the steel industry, the group with more than 10 years of working experience was the dominant at 32.0%, followed by that with between 3–5 years of working experience at 27.6%, that with 6–10 years of working experience at 25.6%, and that with less than 3 years at 14.8%. Most respondents had a monthly salary of 10,000–20,000 TBH at 48.8%, followed by those with a monthly salary of 20,000–30,000 TBH at 26.0%, those with a monthly salary of more than 30,000 TBH at 18.8%, and those with a monthly salary of less than 10,000 TBH at 6.4%.

### 3.3 Convergent and Construct Validity

SEM integrates various techniques of variances analysis by using its principle to apply together in the hypothesis testing. This study used SEM to test by using confirmatory factor analysis (CFA), covariance, and correlation. Thus, SEM could either be the technique for cause or relationship finding. The SEM analysis in this study contained two parts, namely, measurement model and structural model. The measurement model was assessed using CFA. CFA confirms the relationship between observed variables in accordance with theories or previous research. CFA is also a sub-technique for SEM analysis. In this study, the construct validity was assessed by the parameter estimation method in each construct measurement model. The structural model was assessed by homological validity to estimate the measurement model and structural relations. SEM analyzes constructs by measuring on construct reliability and average variance extracted (AVE). AVE is the variance in the indicators as


ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

explained by the common factor and average trait-related variance extracted. The reliability of a construct is determined from the computation of composite reliability (CR) of a construct. CR is the measurement of the overall reliability from the heterogeneous collection from similar items. CR should be more than 0.70, and AVE should be more than 0.50. Hair, Anderson, Tatham, and William (1998) and Anderson and Gerbing (1988) stated that AVE above 0.50 indicates convergent validity. Prior to assessing the constructs by using CR and AVE, each item should be assessed first. The value of loading should be 0.60 (Nunnally, 1978). Therefore, each item should possess a minimum factor loading of 0.60 on its hypothesized construct. The item that is lower than 0.60 will be dropped, and this item must not exceed 0.85 in the discriminant validity testing. The convergent and discriminant validities were tested by CFA in the current study. The convergent validity testing was conducted to verify whether the indicators could represent the latent variables, whereas discriminant validity testing was performed to show whether the observe variables represented the same latent variables and did not associate with the observe variables of the other latent variables. The result of variable testing is presented in Figure 3.2.

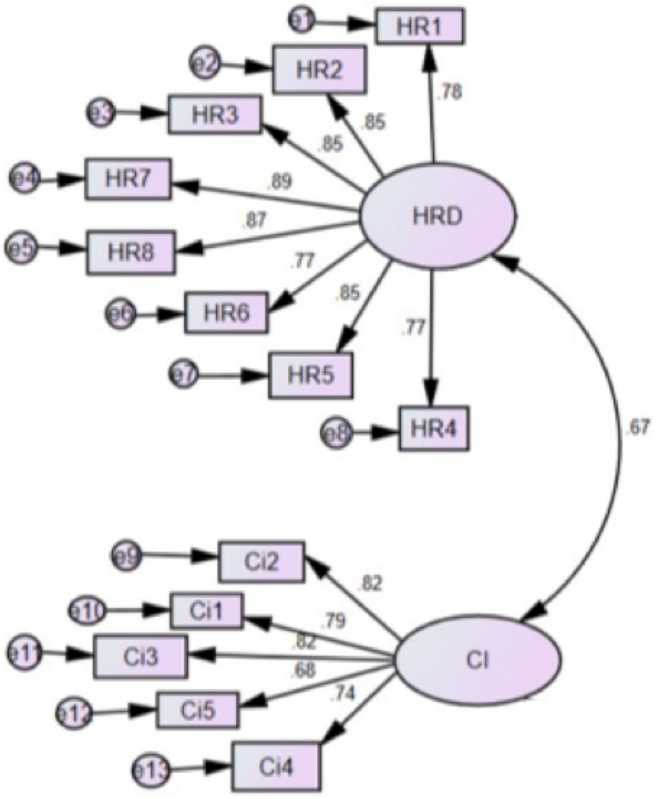


**Figure 3.2** Factor Loading


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### 3.4 Relationship among independent, mediator, and dependent variables

This section illustrates the assessment of the model proposed in this study. The concept in this study was CI success. The aim was to seek for the relationship between HRD and CI. After creating the model, the model fit testing was conducted following the methodology as the SEM analysis. The result of model fit testing is shown in Table 3.2.

**Table 3.2** Measuring of model fit

| Model Fit Criteria | Value | Acceptable Level Value |
|---|---|---|
| Chi-Square | 2175.329 | - |
| Degree of freedom | 458 | - |
| Chi-Square /Degree of freedom | 4.75 | Less than 2 |
| p-value | 0.000 | p > 0.05 |
| GFI | 0.719 | >= 0.90 |
| AGFI | 0.676 | >= 0.80 |
| RMR | 0.311 | Close to Zero |
| RMAEA | 0.098 | < 0.10 |
| NFI | 0.828 | > 0.90 |
| CFI | 0.859 | > 0.90 |
| Holster | 96 | > 200 |

## 4.1 CONCLUSION

The steel industry has applied HRD and full CI strategies, such as the organization learning to achieve tremendous growth and development as an organization. Employees in the steel industry have practiced CI activities, such as everyone learns from their positive and negative experiences, employees search opportunities for learning and personal development by setting their own learning/career objectives, and employees feel comfortable to reach out to colleagues at all levels in the organization to share and receive information needed to support their work. Managers accept and act on all of the learning that occurs when necessary, and appropriate organizational processes are used to deploy what has been learned across the organization. A fault may occur in the first stage of a strategy used for the first time. However, as the strategy is improved and adjusted, repetition can remedy any fault. Subsequently, such fallibility can be dealt with immediately. This feature


ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

can build the self-efficacy required for learning experiences using strategies accurately. Although some strategies are effective in a particular country, different effects in particular parts of a strategy may occur in other countries. The resulting different experiences can occur owing to various organizational cultures. Work-related obstacles also frequently arise. Although one problem is solved, a new problem will predictably arise. Therefore, CI is necessary for every organization to solve its difficulties and enhance its contributions. Thus, all personnel of the steel-manufacturing group are significant representatives of all organizations. The study revealed that, if the organizations utilize a CI strategy in their management, then their personnel's performance would increase. The steel industry is the organization that drives many countries forward. Thus, an in-depth case study of other industries might be useful to deepen understanding on this topic.

### 5.1 Future research

Every organization needs to consider the importance of maintaining product quality and product development. Production costs must be economical, and the product must be beneficial to the organization. Many achievements are accomplished by the capacities of all-level personnel in a particular organization, including managers from various divisions, such as human resources, machinery, strategy, product quality, marketing, and product improvement. Personnel must be expert in the production. The current researcher recommends further research on HRD in terms of performance management. Such management substantially involves HRD in every organization. Additional and related future research would be related to administration strategies. Strategic theories for administration should be introduced to the organization to create competitive advantage. Examples of strategic theories are TRIZ methodology and the Monozukuri development of industrial personnel. Apart from strategic theories, the factors that prevent the increase in industrial products should be studied through engagement in organizational development. Organizational development plays a role in searching and solving these problems. Further research might focus on other organizations that integrate CI with HRD for developing the effectiveness of the organization's personnel. Illustrations of other organizations would include governmental, service, export manufacturing, health, and educational organizations. Finally, future research could involve the study of learning organization. The learning organization under study exerts a substantial influence on personal development in terms of HRD and CI. Therefore, a key step is to develop personnel in the organization considering that manpower is a significant factor in developing every part of the organization.


ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

## ACKNOWLEDGMENTS

The researcher greatly appreciated the support provided by Assoc. Prof. Dr. Chanongkorn Kuntonbutr and Dr. Natnarong Jaturat at Rajamangala University of Technology Thanyaburi in Thailand. Their inquiries and suggestions provided important information for developing the related works.

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ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)