Doctoral Dissertation

# Training Effectiveness of Skill Certification System: The Case of Automotive Industry in Thailand

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# Training Effectiveness of Skill Certification System: The Case of Automotive Industry in Thailand

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## Abstract

Evaluation in terms of training effectiveness is beneficial to both employees and management while it has not been implemented very well in organizations. In fact, most of researches and practices on training effectiveness in Thailand, the case country of the present study, has focused on Kirkpatrick's level one (reaction) and level two (learning) because of the difficulty of obtaining relevant information on further levels, much training in Thailand ignores behavior (level three) and results (level four). Consequently, Thai human resource development (HRD) professionals will continue to make decisions based on reaction and learning level only (Yamnil and McLean, 2005). A skill certification system for the automotive industry in Thailand is also not the exception. It has not been evaluated comprehensively so far. Thus, this study tries to evaluate the effectiveness of the skill certification system with training program by using Kirkpatrick's model and investigate the influence of moderator variables on training effectiveness. By considering the role of trainees' individual and work environment characteristics as influencing

training effectiveness, it will be possible to more comprehensively understand why training is or is not effective. Kirkpatrick's model doesn't explicitly incorporate these factors and, in effect, and it is assumed that the examination based on the model is not sufficient for appropriate training evaluation. The system was implemented under Automotive Human Resource Development Project (AHRDP). AHRDP was started in 2006, as part of the Japanese Official Development Assistance (ODA) program, in cooperation with the Thai government and private sectors in both countries.

The main objective of the dissertation is to analyze effectiveness of skill certification system for automotive industry in Thailand by using Kirkpatrick's model. The specific objectives of this dissertation are: in the case of skill certification system with training program in Thai automotive industry, (1) to investigate Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes (chapter 5); (2) to investigate four levels of Kirkpatrick's model with modification with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, social and organizational support (chapter 6); and (3) to investigate specifically the relationship between learning and behavior change from training with a focus on moderating influences of social and organizational support, that is, supervisor, co-worker, and organizational support (chapter 7).

The research framework has been developed and empirically tested with Structural Equation Model (SEM) for analyzing the data in Chapter 5, which enables to identify the relationship among the variables all at once. As SEM has not been utilized in related studies, the analysis will be a new challenge in methodology. Moreover, Chapter 6 and 7 analyzed data by path analysis and the hierarchical regression analysis for assessing the influence of the moderating variables on independent-dependent relationships.

This study collected data by using a field survey. The questionnaire survey was implemented during November and December of 2012 through face-to-face interviews with 228 persons by 10 research assistants. However, considerable ratio of participants in a skill certification system could attend multiple levels training subjects. Therefore, they were asked about the last certificate that they obtained among others. All survey participants passed the skill certification exam after training in the sub-program and 228, all of those who were interviewed, provided valid responses.

Chapter structure of this dissertation is as follows. Chapter 1 describes the research background, the objectives of the study and research questions, the significance of the study, the scope, conceptual framework, definition of terms, and organization of the study. Chapter 2 contains a theoretical background focuses specifically on Kirkpatrick's model. Chapter 3 is literature review: meta-analysis of training effectiveness and descriptive review on individual and work characteristics. The results of meta-analysis found that only aggregate of reaction tended to correlate positively with learning. Learning including declarative knowledge, procedural knowledge, and retention had significant relationships with behavior. The results of descriptive review on individual trainee and work environment characteristics indicated that self-efficacy, learning motivation, motivation to transfer and social support have direct effects on the training effectiveness. However, little previous empirical studies focused on those characteristics as moderators on the relationships between training outcome variables, specifically on the relationship of reaction, learning, and behavior. Chapter 4 presents overview of Thai automotive industry, skill certification system, and research methodology.

Chapter 5 investigated progressive causal relationship of Kirkpatrick's model from reaction, learning, behavior, to results and focused specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes. This

study makes two specific findings. First, it shows the progressive causal relationship of Kirkpatrick's model was proved excluding the one between affective reaction and learning. Second, two kinds of reactions, affective and utility reactions, were hypothesized to impact learning. The results of the present study underlined that trainee utility reactions had a significant relationship to learning.

Chapter 6 integrated the individual and work environment characteristics on four-levels of Kirkpatrick's model. We adopted four variables concerning learning motivation, self-efficacy, motivation to transfer, social and organizational support. Not merely their direct effects on training outcomes, we also investigate their moderationon the relationships between reaction (L1) and learning (L2), and behavior (L3). The results of this chapter confirm the progressive causal relationship of reaction, learning, and behavior to results. In particular, this finding highlighted the direct relationship between (1) self-efficacy and learning, and (2) learning motivation and learning. Although the result of motivation to transfer as a moderating variable has negative effects on the relationship between learning and behavior, social and organizational support directly affects behavior change after training and moderates the relationship between learning and behavior. The results of this chapter confirm some aspects of the influence of the individual and work environment characteristics on training outcomes and they have implications for enhancing training effectiveness.

Chapter 7 investigate specifically the relationship between learning and behavior from training with a focus on moderating influences of social support, that is, supervisor, co-worker, and organizational support. The findings indicate that learning from training had a positive relationship with training transfer. Only co-worker support was significantly and positively related to transfer of training and moderates the relationship between learning and behavior. When trainees learning successfully and had high co-worker support, they displayed more behavioral change on the job. Furthermore, this chapter also

provides an in-depth investigation on the role of social and organizational support as moderators into the training transfer by two groups of work, that is, blue-collar and white-collar works. The results of both blue-collar and white-collar works indicate that a co-worker support as a moderating variable has a positive effect on the relationship between learning and behavior.

The overall findings of this dissertation are considered to provide a useful contribution to academic research and HRD professionals in Thai automotive industry (as implementers). The evaluations can be useful to improve the program and suggest the appropriate HRD policies and practices for organizations in the industry.

As to academic knowledge, this study expands our understanding of the progressive causal relationship of reaction, learning, and behavior to results. In addition,this study contributes to our understanding of individual and work environment characteristic variables, which are: learning motivation, self-efficacy, motivation to transfer, social and organizational support, as moderators of the relationship between training and its outcome.

The implications of the expanded hierarchy model of training evaluation are quite important for HRD professionals in Thai automotive industry. For training evaluation, if the extent of behavior does not improve as intended, we should examine the amount and types of learning that occurred. However, we should also think about the opportunities that trainees have had to use the training on the job. Furthermore, if organizational results such as improved productivity do not occur, we should examine the quality of job behavior improvement.

Organizations can improve learning by ensuring that trainees believe that they have the capabilities to successfully learn the new knowledge and skills from training (self-efficacy for learning). This can be improved by (1) showing trainees that other employees who have received the training have successfully improved their knowledge and skills and (2) providing information for trainees on how the learner can achieve success under the training context.

In terms of training transfer in the workplace, the role of social support in directly affecting behavior change after training and moderating the relationship between learning and behavior demonstrates the practical implications from the training. HRD practitioners should be supporting infrastructures that can be used to further enhance co-worker learning. For example, chat room discussions could be utilized to improve training transfer. Although the skill certification system is designed for the automotive industry, we have a variety of occupations for skill certification. If, following training, trainees are able to develop a peer networking or learning system from different organizations for sharing knowledge and skills, it may be potentially beneficial to each organization.

However, for the longer term, organizations must improve the quality of other types of social and organizational support as well to exploit the opportunities for transfer of training more effectively. As implied by the analytical results, under the current conditions, we cannot expect that more provision of supervisor and organizational supports will affect training transfer both independently and in combination with more learning. Hence, efforts have to be made to improve the quality of those supports.

This study has several limitations. First, this study relied on self-assessment measures, which may have caused some common-method variance problems that may inflate observed relationships between variables. Further, where possible, these appraisals should be performed by multiple sources, including the individual receiving the training, the person's supervisor(s), the person's subordinates, and the person's peers. Second, this study didn't control for a variety of course features and demographic variables that may influence trainees' experiences and evaluation of the training they received. Finally, further empirical studies of training effectiveness need to conduct return on investment (ROI) of skill certification system in Thai automotive industry.

**Acknowledgements**

I would like to express my sincere gratitude and appreciation to many individuals and organizations that provided great assistance and support to my study. Without their support, I would not have completed this dissertation successfully.

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I wish to add that any errors, shortcoming and limitations in this dissertation are entirely my own responsibility.

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# Chapter 1

# Introduction

This chapter introduces the research background and research questions, followed by the objectives of the study. Additionally, it describes the significance of the study, followed by the scope of the study, the research framework and the definition of key terms for analysis on training effectiveness. This chapter is concluding with the organization of the study.

## 1.1 Background of the Study

Evaluation in terms of training effectiveness is beneficial to both employees and management. Therefore evaluation has been conducted as the last step of training cycle. Its main objective is to articulate impediments at individual or organizational level (Mclagan, 1989). Kirkpatrick & Kirkpatrick (2006) pointed the reason why measurement of training effectiveness is required more in details; (1) to judge continue or scrap the program, (2) to judge its relevance to the objectives, (3) to know how to improve it, (4) to justify its budget, and (5) to prove its necessity.

As to the study of training effectiveness, there have been arguments from several aspects; such as the necessity of evaluation in the whole processes of training cycle (Birkenholz, 1999; Guskey, 2000; Sork, 2000; Tracy, 1992; Vella et al., 1998), typifying the methodologies (Phillips et al., 2006; Sum, 2007). Historically, since the middle of the previous century, Kirkpatrick's four levels model consisting of reaction, learning, job behavior, and result, has been the basis for further application and customization. Here main focus was on

improvement in training itself, as that was enough to persuade the management, relatively speaking during that period. More recently, in accordance with more serious requirement from the management, Return on Investment (ROI) was added to the effectiveness indicators (Phillips, 2003).

The other discussion point for Kirkpatrick's model is the causal relationship from reaction, learning, job behavior, and result. Kirkpatrick himself suggested clear causal relationship among the levels. For instance, trainees' satisfaction is important to make training effective and in turn enhance learning. Or without learning, behavioral change will not occur (Kirkpatrick, 1994). More recently the emphasis was on that correct measurement of all four levels should start from level one and progress step by step (Kirkpatrick and Kirkpatrick, 2006). However, several studies of training evaluation have failed to confirm the hierarchical relationship of reaction, learning, and behavior to results because of the difficulty of measuring them. Two meta-analyses of training evaluation studies, Alliger and Janak (1989) and Alliger et al. (1997) investigated the relationship among training criteria by using Kirkpatrick's model. They found little evidence either of substantial correlations between measures at different outcome levels or of the linear causality suggested by Kirkpatrick (1994). Thus, as the model is still widely but only partially used in academic circles and by businesses, training evaluation academics tend to emphasize the need to examine all four of Kirkpatrick's evaluation levels.

The other new trend is integrating the other factors in Kirkpatrick four-level evaluation model such as a wide range of organizational, individual, and training design and delivery factors that can influence training effectiveness before, during, or after training (e.g. Cannon-Bowers et al., 1995; Ford and Kraiger, 1995; Holton, 1996; Salas and Cannon-Bowers, 2001; Tannenbaum and Yukl, 1992). However, Kirkpatrick's model implicitly assumes that

examination of those factors is not essential for effective evaluation. These researches have led to a new understanding of training effectiveness that consider characteristic of the individual trainee and characteristics of the organization and work environment as crucial input factors. For example, there have been contextual factors analyzed such as the learning culture of the organization (Tracy, Tannenbaum and Kavanaugh, 1995), organizational or work unit goals and values (Ford, Quinones, Sego, and Sorra, 1992), the nature of interpersonal support in the workplace for skill acquisition and behavior change (Bates, Holton, Seyler, and Carvalho, 2000), the climate for learning transfer (Rouiler and Goldstein, 1993), and the adequacy of material resources such as tools, equipment, and supplies. They have been shown to influence the effectiveness of both process and outcomes of training.

To illustrate the training effectiveness by using Kirkpatrick's model, this study analyzes the skill certification system for the automotive industry in Thailand. The system was implemented under Automotive Human Resource Development Project (AHRDP). AHRDP aimed at transferring crucial technologies and standard emphasized on developing the body of knowledge to enable industry-wide development in order to support the growth of Thailand automotive industry. As a technical cooperation, AHRDP has outstanding feature that the different private firms participated in the same umbrella program. As each firm decided to focus on the area of one's strength, four major Japanese firms in automotive industry including Toyota, Honda, Nissan, and Denso were taking production management, mold and die technology, skill certification system, and manufacturing skill and mind formation.

Along with the strategy above, AHRDP was started in 2006, as part of the Japanese Official Development Assistance (ODA) program, in cooperation with the Thai government and private sectors in both countries such as Japan External Trade Organization (JETRO), Japanese Chambers of Commerce, Bangkok (JCCB), Ministry of Industry, Thailand (MOI),

Federation of Thai Industries (FTI), Thai Autoparts Manufacturers Association (TAPMA), and four major Japanese firms in automotive industry. Thai Automotive Institute (TAI) was involved as one of the organizers of the program. The program became one of major technical cooperation projects under Japan-Thailand Economic Partnership Agreement (JTEPA) that took effect in November 2007.

This particular training program for skill certification was selected as a case example for several reasons. First, this program is a good representative of the training in Thai automotive industry for improving knowledge and skills of employees. This program was one of the sub-programs under the AHRDP and is expected to be very significant because of its potential impact on the whole industry. Second, the skill certification system has already provided training in Thai automotive industry. More than 300 persons passed the skill certification exam after training. That means learning required to certificates has been accomplished for those cases as planned. However, the next steps, "transfer of learning and results" have not been investigated yet. It is important for identifying relevance, impact of learning contents to workplaces, and the results of training after skill test passers went back. Third, the effectiveness of skill certification system has not been investigated yet. This is the first study for investigating the effectiveness of skill certification system by using Kirkpatrick's model.

The case industry, Thai automotive industry has developed over the past 50 years and became a major industry with significance to the economy through employment, value added and technology development in Thailand as well as supply chain related industries (Thai Automotive Institute, 2012). Since the end of the previous century firms of Thai automotive industry have faced more serious international competition and regional market will be more intense. Under these circumstances, even second and third tier auto parts manufacturers are

required to improve their competitiveness in terms of quality, delivery, and cost. To accomplish these goals, development and accumulation of capable human resources have become more important management objective.

Thai government formulated master plans for developing Thai automotive industry. One strategy of the plans is developing human resource in management and production. Human resource development (HRD) is a key factor in creating competitive advantage for Thailand automotive industry emphasizing on formal education system, training system that meet the industry demand. The Ministry of Industry is the main organization for developing the human resources in the automotive industry, by allocating budget to various entities and appointed TAI as the lead entity in HRD in the automotive industry together with automobile assemblers and TAPMA. The main proposal is to empower human resources in the automotive industry by enhancing their knowledge, skill and ability (Thai Automotive Institute, 2012).

## 1.2 Objectives of the Study

The main objective of the dissertation is to analyze effectiveness of skill certification system for automotive industry in Thailand by using Kirkpatrick's model.

The specific objectives of this dissertation are:

1) To investigate Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes.
2) To investigate four levels of Kirkpatrick's model with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, social and organizational support.

3) To investigate specifically the relationship between learning and behavior from training with a focus on moderating influences of social support, that is, supervisor, co-worker, and organizational support.

### 1.3 Significance of the Study

Most of research on training effectiveness in Thailand, the case country of the present study, has focused on Kirkpatrick's level one (reaction) and level two (learning) because of the difficulty of obtaining relevant information on further levels while much training in Thailand ignores behavior (level three) and results (level four). Consequently, Thai HRD professionals will continue to make decisions based on reaction and learning level only (Yamnil and McLean, 2005). A skill certification system for the automotive industry in Thailand is also not the exception. It has not been evaluated comprehensively so far. Thus, this study tries to evaluate the effectiveness of the skill training and certification program by using Kirkpatrick's model and investigate the influence of moderator variables on training effectiveness. Without considering the role of trainees' individual and work environment characteristics as influencing training effectiveness, it is not possible to fully understand why training is or is not effective. Kirkpatrick's model doesn't explicitly incorporate these factors and, in effect, assumes the examination of the additional factors is not very influential for appropriate training evaluation.

This study expands our understanding of the progressive causal relationship of reaction, learning, and behavior to results. In particular, it contributes to our understanding of individual and work environment characteristic variables, which are: learning motivation, self-efficacy, motivation to transfer, social and organizational support, as moderators of the relationship between training and its outcome. The evaluations can be useful to improve the

program and suggest the appropriate HRD policies and practices for organizations in the industry. Furthermore, this study can provide useful knowledge of training effectiveness and the important criteria for training evaluation to researchers and implementers.

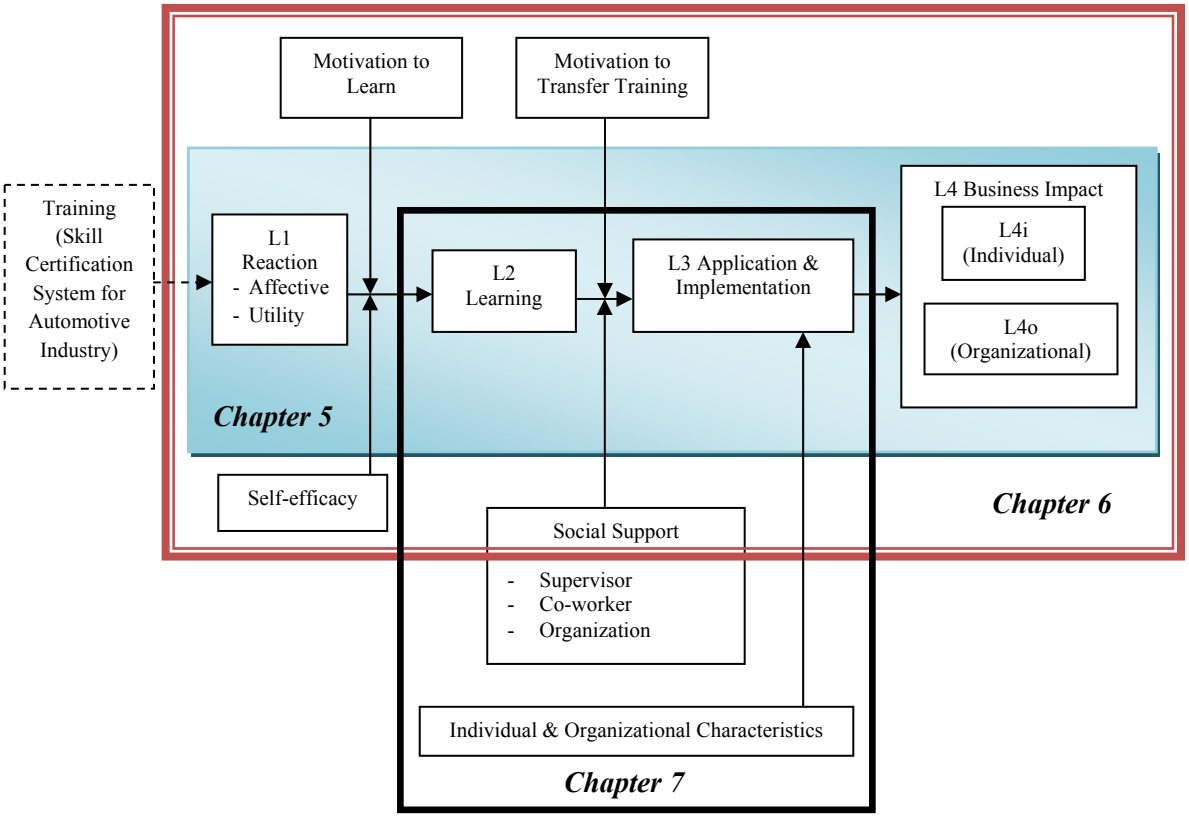
### 1.4 Scope of the Study

This dissertation focuses on the effectiveness of skill certification system for automotive industry in Thailand. The case of the present study was one of the sub-programs under AHRDP. Specifically, the analysis is carried out with investigating by Kirkpatrick's model. The author collected data by using a field survey of skill certification system for automotive industry in Thailand. Questionnaires were distributed to all the participants who passed the skill certification exam after the relevant training from 2006 to 2011.

### 1.5 Research Framework

The conceptual framework was constructed by the author and used as the study guideline. The framework is below as figure 1-1. Based on the literature review in Chapter 3, this study tries to develop more integrated framework and with that framework to analyze comprehensively the relationship among training outcomes and moderators. All the relationships identified in the framework have been proved in the previous studies somehow but not in the comprehensive manner. For this purpose, well-recognized "four levels" for training evaluation (Kirkpatrick, 1994) in HRD study is utilized as the basic components of the model.

**Figure 1-1:** Overall research framework




One important discussion point for Kirkpatrick's model is its emphasis on the progressive causal relationship from reaction (L1), learning (L2), behavior (L3), to result (L4) as mentioned above. More recently the emphasis was on that correct measurement of all four levels should start from level one and progress step by step (Kirkpatrick and Kirkpatrick, 2006) while empirically this point has not been well proved. The present study attempts to cover all those levels, from L1 to L4 by statistical analysis. In addition, we also investigate moderator variables on the relationship between L1 and L2, L2 and L3, such as learning motivation, self-efficacy, motivation to transfer, and social support. Furthermore, the distinction between learning and job behavior has drawn increased attention to the importance of the learning transfer process in making training truly effective (Bates and Coyne, 2005).

This study highlights the specific dimension of social support including supervisor, co-worker or peer, and organizational support as the moderating variable on the relationship between learning and behavior. This is because social support factor has been recognized increasingly to be the important indicator for transfer of training among researchers.

### 1.6 Definition of Terms

*Training effectiveness* is determined with respect to the achievement of training's goal or set of training's goal (Warner and DeSimone, 2009).

*Training evaluation* is defined as the systematic collection, analysis, and synthesis of descriptive and judgmental information necessary to make effective training decisions related to the selection, adoption, value, and modification of various instructional activities (Warner and DeSimone, 2009).

Based on Kirkpatrick's (1976, 1994) model this study defines key terms for analysis on training effectiveness as follows:

*Reaction* refers to assess trainees' feelings for and liking of a training program. Affective reactions measure the extent to which a participant "liked" or was satisfied with different components of the training (e.g. course structure, testing process, instructors, materials, training management and administration process). Utility reactions consider the extent to which the participants can apply the content of training to their job.

*Learning* refers to the knowledge, skills, and attitude acquired by trainees. Evaluation on learning aims at understanding trainees' comprehension of instruction, principles, ideas, knowledge and skills from training.

*Behavior or transfer* refers to the extent to which a change in behavior has occurred because the trainees attended the program, which is measured (assessed) in the workplace.

This level attempts to determine whether trainees (who can apply the acquired specific knowledge and/or skills) use their new knowledge and/or skills when returning to the work environment. If knowledge, skills, and attitude learned are transferred to the job, the training effort cannot have an impact on employee or organizational effectiveness.

*Results* refer to the final results that occurred because the trainees attended the program. These could include the attainment of organizational objectives and individual benefits such as (1) increasing productivity, quality and sales, (2) decreasing cost and cycle time production (3) career development, (4) received a bonus and promotion, (5) improved job performance and job involvement, and (6) more commitment and loyalty with company.

In addition, the other key terms, that is, moderator variables for investigating on training effectiveness were defined as follow:

*Learning motivation or motivation to learn* refers to the desire of the trainee to learn the contents of the training program (Noe, 1986).

*Self-efficacy* refers to an individual's belief that he or she can perform a specific task (Bandura, 1986). In particular, self-efficacy in this study refers to an individual's belief in his or her ability to learn and succeed in training.

*Motivation to transfer* refers to the learner's intended efforts to utilize knowledge and skills learned in a training setting to the workplace (Noe, 1986).

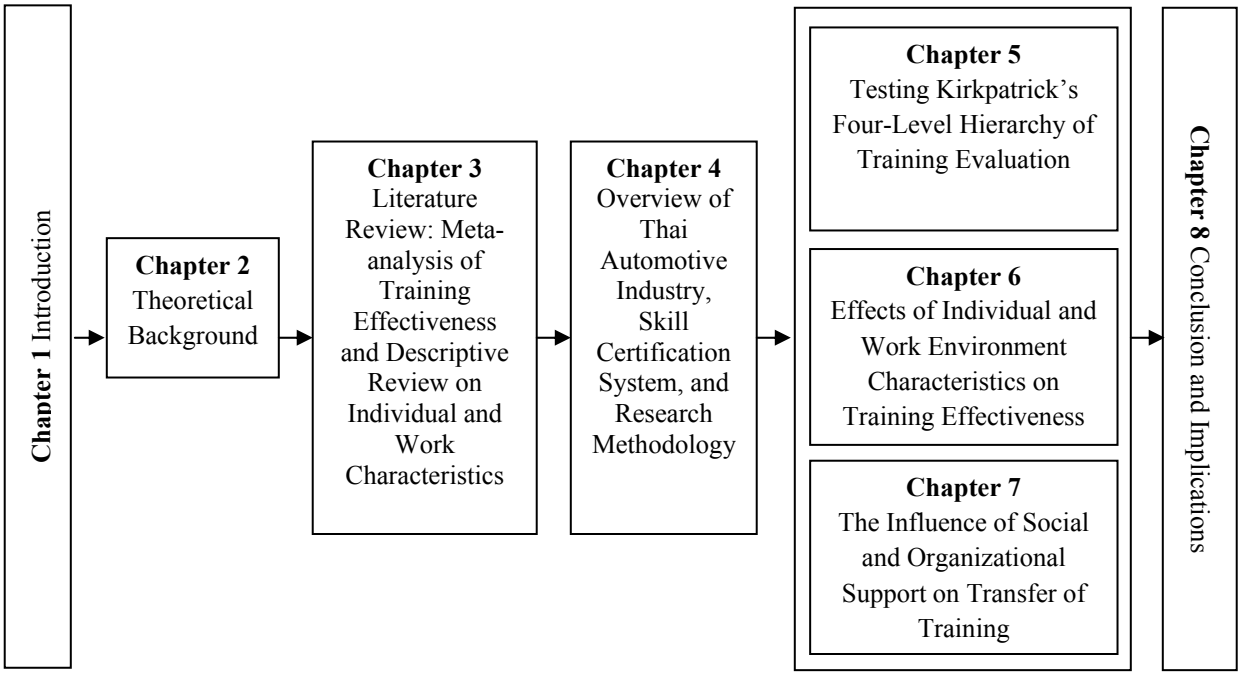
*Social and organizational support.* This study investigates social support from supervisors and co-workers. Supervisor support has the critical role of providing reinforcement for learning on the job. Co-worker support focuses predominantly on supporting the use of learning on the job. This support could include giving assistance, or offering positive feedback. Organizational support consists of material goods, such as transportation,

money, or physical assistance, support for the transfer of training in the workplace, and training opportunities and related information for workers.

### 1.7 Organization of the Dissertation

This dissertation has eight chapters as described in Figure 1-2. Chapter 1 introduces the research background, the objectives of the study and research questions, the significance of the study, the scope, conceptual framework, definition of terms, and organization of the study. Chapter 2 contains a theoretical background and covers the main concepts and theory. Chapter 3 is a literature review: meta-analysis of training effectiveness and descriptive review on individual and work characteristics as moderators. Chapter 4 presents overview of Thai automotive industry, skill certification system, and research methodology. Chapter 5, 6, and 7 are the main analysis of Training Effectiveness of Skill Certification System: The Case of Automotive Industry in Thailand. Chapter 5 investigates Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes. Chapter 6 investigates four levels of Kirkpatrick's model with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, and social and organizational support. Chapter 7 is testing the training transfer in terms of Kirkpatrick's two levels of evaluation: learning and behavior and incorporating social support, that is, supervisor, co-worker, and organizational support as moderators into the main analysis model on the relationship between learning and behavior. The last chapter, Chapter 8 provides the conclusions, policy implications from the main findings, and the limitations of this study, as well as suggests direction for further research.

**Figure 1-2**: Organization of the dissertation



# Chapter 2

# Theoretical Background

This chapter presents a comprehensive review of the theoretical background. It consists of three main sections. Section one defines the main concepts of training effectiveness and training evaluation. Section two is providing a description of the Kirkpatrick four-level evaluation model. More specifically this chapter provides the several reasons why this model is popular in organizations and several fundamental limitations of the model are discussed. The last section of this chapter is the modification of Kirkpatrick's model and reviews the models and frameworks of evaluation

## 2.1 Training Effectiveness and Training Evaluation

Training effectiveness is determined with respect to the achievement of training's goal or set of training's goals (Warner and DeSimone, 2009). In other words, training effectiveness must be determined in relation to goals of the program or programs being examined.

Training evaluation is defined as the systematic collection, analysis, and synthesis of descriptive and judgmental information necessary to make effective training decisions related to the selection, adoption, value, and modification of various instructional activities (Warner and DeSimone, 2009). This definition mentions both descriptive and judgmental information which provide a picture of what is happening or has happened, and show some opinion or belief about what has happened in any given training and development intervention. Training evaluation includes the systematic collection, analysis, and synthesis of information according

to a predetermined plan to ensure the information is appropriate and useful. Furthermore, an evaluation of training can help managers, employees, and HRD professionals make informed decisions about particular programs and methods.

Training evaluation has provided several benefits which training practitioners and academics alike agree. Training evaluation can help to: (1) determine whether a program is accomplishing its objectives; (2) identify the strengths and weaknesses of HRD programs, which can lead to changes, as needed; (3) decide who should participate in future HRD programs; (4) identify which participants benefited the most or least from the program; (5) gather data to assist in marketing future programs; and (6) establish a database to assist management in making decision (Phillips, 1983). Furthermore, there are other benefits as well. For example, Zenger and Hargis (1982) identify two additional reasons for conducting training evaluations: (1) if HRD staff cannot substantiate its contribution to an organization, its funding and programs may be cut during the budgeting process, especially if an organization faces tough times; and (2) evaluation can build credibility with top managers and others in an organization.

In sum, training evaluation is a methodological approach for measuring learning outcomes. Training effectiveness is a theoretical approach for understanding those outcomes. Because training evaluation focuses solely on learning outcomes, it provides a micro view of training results. Conversely, training effectiveness focuses on the learning system as a whole, thus providing a macro view of training outcomes. Evaluation seeks to find the benefits of training to individuals in the form of learning and enhanced on-the-job performance. Effectiveness seeks to benefit the organization by determining why individuals learned or did not learn. Finally, evaluation results describe what happened as a result of the training

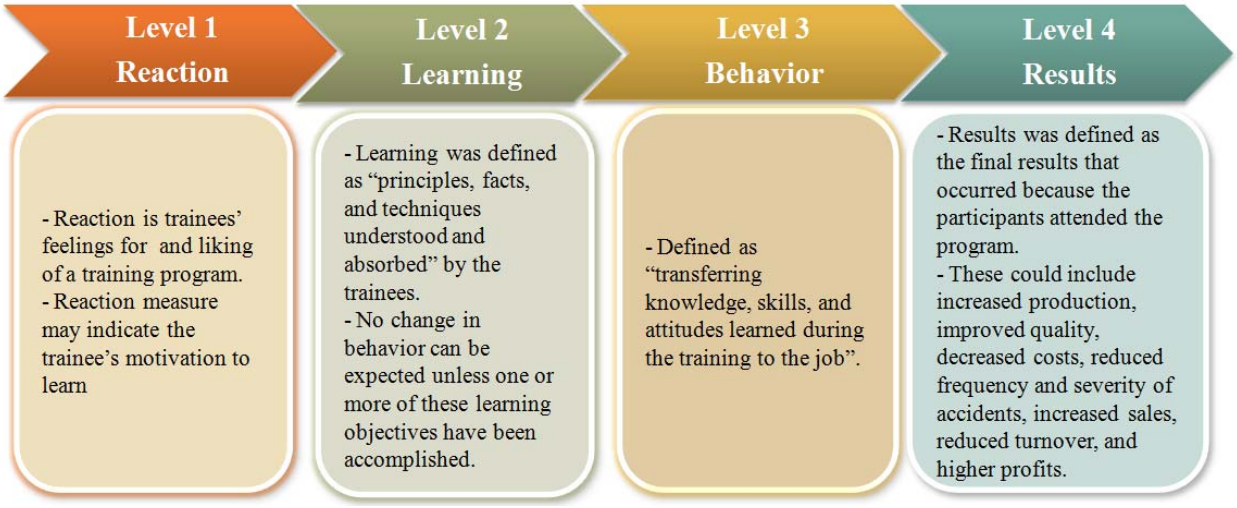
intervention. Effectiveness findings tell us why those results happened and so assist experts with developing prescriptions for improving training (Alvarez, Salas, and Garofano, 2004).

## 2.2 Kirkpatrick's Evaluation Framework

The Kirkpatrick four-level evaluation model was established in 1959 by Donald Kirkpatrick. It has served as the primary framework and most popular approach to the evaluation of training in organizations for over 50 years. There is no doubt the model has made valuable contributions to training evaluation in thinking and practice. It has helped focus training evaluation practice on outcomes (Newstrom, 1995) and underscored the importance of examining multiple measures of training effectiveness.

Kirpatrick's (1976, 1994) training evaluation model delineates four levels of training outcomes: reaction, learning, behavior, and results.

**Figure 2-1:** The Kirkpatrick four-level evaluation model




Source: Kirkpatrick (1994), Alliger and Janak (1989)

Level one, reaction includes assessment of training participants' reaction to the training program. Kirkpatrick (1959) originally discussed reactions in terms of how well trainees liked

a particular training program. In other words, reaction is trainees' feelings for and liking of a training program. At this level, the focus is on the trainees' perceptions about a program and its effectiveness. In practice, measures at this level have evolved and are most commonly directed at assessing trainees' affective responses to the quality (e.g. satisfaction with the instructor) or the relevance (e.g. work-related utility) of training. Positive reactions to a training program may make it easier to encourage employees to attend future programs. But if trainees did not like the program or think they are less likely to learn, they may discourage others from attending and be reluctant to use the knowledge and skills obtained in the training program. The main limitation of evaluating at the reaction level is that this information cannot indicate whether the program met the objectives beyond ensuring participant satisfaction (Warner and DeSimone, 2009).

Level two, defined as the extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program. No change in behavior can be expected unless one or more of these learning objectives has been accomplished (Kirkpatrick, 1994). This level of evaluation allows trainees to demonstrate their understanding of specific knowledge, skills, and attitude (KSAs) within the learning program.

Level three, behavior or transfer, refers to the knowledge and skills transferred to the job by trainees. This level attempts to determine whether trainees (who can apply the acquired specific knowledge and/or skills) use their new knowledge and/or skills when returning to the work environment. If KSAs learned are not transferred to the job, the training effort cannot have an impact on employee or organizational effectiveness.

Level four, results refers to the final results that occurred because the trainees attended the program (Kirkpatrick, 1994). These could include the attainment of organizational goals and objectives, such as a reduction in absenteeism and personnel turnover, productivity gains,

and cost reductions. In recent practice, the typical focus of these measures has been on organizational level financial measures.

### 2.2.1 The Assumptions of the Four-level Model

Kirkpatrick insisted that information about level four outcomes is perhaps the most valuable or descriptive information about training that can be obtained. The four-level model has therefore provided a means for trainers in organizations to couch the results of what they do in business terms. Many see this as critical if the training function is to become a true business partner and be seen as an active contributor to organizational success (Bates, 2004).

In addition, Alliger and Janak (1989) discussed Kirkpatrick's model in the light of three assumptions that appear to be largely implicit in the minds of researchers and trainers, although to all appearances unintended by Kirkpatrick himself when the model was proposed. The first assumption is that the "steps" are arranged in ascending value of information than does a measure of reaction, and so forth. In fact, the term "levels" of criteria referred to the more purely procedural term "steps" (Goldstein, 1986). The second assumption is that these levels of evaluation are causally linked. For example, training leads to reactions which lead to learning which leads to change in job behavior which lead to changes in the organization (Hamblin, 1974). A third assumption is that the levels are positively intercorrelated. That is, a set of essentially positive interrelationships, or "positive manifold", is posited to exist among levels of training evaluation (Newstrom, 1978). Each of these three assumptions about Kirkpatrick's steps appears to be codified in what has been termed the "hierarchical model" of training evaluation (Hamblin, 1974; Noe and Schmitt, 1986), where "favorable outcomes at the lowest criterion level are seen to be necessary for favorable outcomes to occur at the next higher level, and so on" (Clement, 1982)

### 2.2.2 The Popularity of the Four-level Model

The Kirkpatrick's model has served as the primary organizing design for training evaluations in for-profit organizations for over fifty years. The popularity of the model can be attributed to several factors. First, the model addressed the need of training professional to understand training evaluation in a systematic way (Shelton and Alliger, 1993). It has provided straight forward system or language for talking about training outcomes and the kinds of information that can be provided to assess the extent to which training programs have achieved certain objectives. Alliger and Janak (1989) conducted a meta-analysis review of the literature based on Kirkpatrick's model. They concluded that Kirkpatrick's model provides an easily adopted vocabulary and rough taxonomy for criteria and number of (often implicit) assumptions.

Second, the popularity of the four-level model is also a function of its potential for simplifying the complex process of training evaluation. The model does this in several ways. For instance, the model represents a straight forward guide about the kinds of questions that should be asked and the criteria that may be appropriate. Next, the model reduces the measurement demands for training evaluation. The model focuses the evaluation process on four classes of outcome data that are generally collected after the training has been completed. Hence it eliminates the need for—or at least implies—that pre-course measures of learning or job performance measures are not essential for determining program effectiveness. Moreover, because conclusions about training effectiveness are based solely on outcome measures, the model greatly reduces the number of variables with which training evaluators need to be concerned. In effect, the model eliminates the need to measure or account for the complex network of factors that surround and interact with the training process.

There is no doubt that Kirkpatrick's model has made valuable contributions to training evaluation thinking and practice. It has helped focus training evaluation practice on outcome (Newstrom, 1995), fostered the recognition that single outcome measures cannot sufficiently reflect the complexity of organizational training programs, and underscored the importance of examining multiple measures of training effectiveness. The model promoted awareness of thinking about and assessing training in business terms (Wang, 2003). The distinction between learning (level two) and behavior (level three) has drawn increased attention to the importance of the learning transfer process in making training truly effective. The model has also served as a useful heuristic for training evaluators (Alliger and Janak, 1989) and has been the seed from which a number of other evaluation model have germinated (e.g. Holton, 1996; Jackson and Kulp, 1978; Kaufman and Kellller, 1994)

### 2.2.3 Limitations of the Four-level Model

There are three limitations of Kirkpatrick's model that have implications for the ability of training evaluators to deliver or evaluate benefits and further the interests of organizational clients. These include the incompleteness of the model, the lacks of the assumption of causality, and the assumption of increasing importance of information as the levels of outcomes are ascended. Some researchers insisted that Kirkpatrick's model has been misunderstood by researchers and practitioners to be hierarchical (Alliger and Janak, 1989; Russ-Eft and Preskill, 2001).

#### *1) The Model is Incomplete*

The four-levels of Kirkpatrick's model present an over simplified view of training effectiveness that does not consider individual or contextual influences in the evaluation of training. Many previous studies over past two decades have integrated other factors in Kirkpatrick four-level evaluation model and they found a wide range of organizational,

individual, and training design and delivery factors that can influence training effectiveness before, during, or after training (e.g. Cannon-Bowers et al., 1995; Ford and Kraiger, 1995; Salas and Cannon-Bowers, 2001; Tannenbaum and Yukl, 1992). These researches have led to a new understanding of training effectiveness that consider characteristics of the individual trainee the organization as well as work environment as crucial input factors. For example, contextual factors such as the learning culture of the organization (Tracy, Tannenbaum and Kavanaugh, 1995), organizational or work unit goals and values (Ford, Quinones, Sego, and Sorra, 1992), the nature of interpersonal support in the workplace for skill acquisition and behavior change (Bates, Holton, Seyler, and Carvalho, 2000) the climate for learning transfer (Rouiler and Goldstein, 1993), and the adequacy of material resources such as tools, equipment, and supplies have been shown to influence the effectiveness of both process and outcomes of training. Furthermore, Kirkpatrick's model implicitly assumes that examination of those factors is not essential for effective evaluation.

***2) The Assumption of Causal Linkages***

The Kirkpatrick's model is considered to assume implicitly that the levels of criteria represent the hierarchy relationship of reaction, learning, and job behavior to results. In the other word, positive reaction lead to greater learning, this produces greater transfer and subsequently more positive organizational results. Although the Kirkpatrick's model isn't clear about the precise nature of the progressive causal linkages between training outcomes, this model can imply that a simple causal relationship exists between the levels of evaluation (Holton, 1996). One important discussion point for Kirkpatrick's model is that without learning behavioral change will not occur. However, several studies of training evaluation have failed to confirm the hierarchical relationship of reaction, learning, and behavior to results because of the difficulty of evaluating training. Two meta-analyses of training

evaluation studies, Alliger and Janak's (1989) and Alliger et al.'s (1997), investigated the relationship among training criteria by using Kirkpatrick's model. They found little evidence either of substantial correlations between measures at different outcome levels or evidence of the linear causality suggested by Kirkpatrick (1994).

***3) Incremental Importance of Information***

Kirkpatrick's model assumes that each level of evaluation provides data that is more informative than the last (Alliger and Janak, 1989). This assumption has generated the perception among training evaluators that establishing level four results will provide the most useful information about training program effectiveness. However, the weak conceptual linkages occur within the model and resulting data it generated do not provide a sufficient basis for this assumption.

## 2.3 Modification of Kirkpatrick's Model

According to the limitations of the Kirkpatrick's model, many model and conceptual framework of training evaluation are adopted and modified from Kirkpatrick's four levels of criteria such as Kaufman and Keller (1994), Holton's (1996) and Phillips's (1996) model. Training researchers have expanded Kirkpatrick's concept to encourage practitioners to do more thorough job of evaluation. Several authors on training evaluations suggest modifications to Kirkpatrick's four-level approach that keep the framework essentially intact. These include:

- Expanding the reaction level to include assessing the participants; reaction to the training methods and efficiency.
- Distinguishing between cognitive and affective reactions to training.

- Splitting the reaction level to include assessing participants' perceptions of enjoyment, usefulness (utility), and the difficulty of the program.
- Distinguishing KSA as well as immediate learning and KSA retained for learning (level 2), use and effectiveness for behavior (level 3).
- Adding a fifth level (beyond results) to specifically address the organization's return on investment (ROI).
- Adding a fifth level (beyond results) to address the societal contributions and outcomes created by an HRD program

There are many frameworks and models of the evaluation process to emphasize the many option available when evaluating training program. Of the frameworks and models of training evaluation, Kirkpatrick's model is the earliest, most popular and influential framework for training evaluation. Many of the other frameworks such as "Context, Input, Process, and Product (CIPP)", Brinkerhoff, and Phillips build upon Kirkpatrick's approach, expanding the focus of evaluation beyond measuring post-program effectiveness, and/or including elements not explicitly stated by Kirkpatrick (Table 2-1).

Galvin (1983) suggested the CIPP model. This model focused on measuring the context for training (needs analysis); input to training (examining the resources available for training, such as budgets and schedules; the process of conducting the training program (for feedback to the implements); and the product or outcome of training (for feedback to the implementers).

Brinkerhoff (1987) extended the training evaluation model to six stages (goal setting, program design, program implementation, immediate outcomes, intermediate or usage outcomes, and impacts and worth). The model suggests a cycle of overlapping steps, with

problems indentified in one step possibly caused by negative occurrences in previous steps. This model differ from Kirkpatrick's by including the earlier phases of the training process, need assessment, design, and implementation, into the evaluation phase. The first three stages of Brinkerhoff's model (goal setting, program design, program implementation) explicitly include these activities.

**Table 2-1:** Training evaluation models/frameworks

| Model/framework | Training evaluation criteria |
|---|---|
| 1. Kirkpatrick (1967, 1987, 1994) | Four levels: Reaction, Learning, Behavior, and Results |
| 2. CIPP (Galvin, 1983) | Four levels: Context, Input, Process, and Product |
| 3. Brinkerhoff (1987) | Six stages: Goal Setting, Program Design, Program Implementation, Immediate Outcomes, Intermediate or Usage Outcomes, and Impacts and Worth |
| 4. Kriger, Ford, and Salas (1993) | A classification scheme that specifies three categories of learning outcomes (cognitive, skill-based, affective) suggested by the literature and proposes evaluation measures appropriate for each category of outcomes |
| 5. Holton (1996) | Identifies five categories of variables and the relationships among them: Secondary Influences, Motivation Elements, Environmental Elements, Outcomes, Ability/Enabling Elements |
| 6. Phillips (1996) | Five levels: Reaction and Planned Action, Learning, Applied Learning on the job, Business Results, Return on Investment |

Source: Warner and DeSimone (2009)

In addition, both models by Kriger, Ford, and Salas (1993) and Holton (1996) attempt to create evaluation methods that specifically focus on research and theory of learning outcomes and the variables that influence them. Kriger et al., (1993) suggested that learning outcomes could be of three types (i.e., cognitive, skill-based, affective), they proposed a classification scheme for evaluating learning outcomes in each of these three areas. This scheme is quite specific, identifying the types of measures that can be used for learning outcomes in each category. Holton (1996) suggested a complex model that has outcomes similar to Kirkpatrick's (i.e., learning, individual performance, and organizational results). The model also included individual variables (e.g., motivation to learn, motivation to transfer, ability, job attitudes) and environmental variables (e.g., transfer climate, external events) that influenced these outcomes.

Following both Kirkpatrick and Phillips, one of the more important issues to examine is the impact of training on an organization's effectiveness. This assessment can be done using a variety of performance indexes, such as productivity, timeliness, and cost savings. It is important to demonstrate effectiveness on the reaction, learning, and job behavior levels, but the organization may be at a disadvantage when their results are compared to those of other divisions for which they are able to express their results in monetary terms. Thus Phillips (1996) represented the results in term of money on return on investment (ROI).

Despite all the criticism, Kirkpatrick's model remains a useful way to identify the criteria of training effectiveness must satisfy. If possible, information assessing all four levels of criteria should be collected (depending on the questions being asked that prompt the evaluation study). Furthermore, Kirkpatrick's four-level model is the most extensively accepted and used, as it is simple, clear, and easy to implement, as training evaluators expect. The model is still widely used in academic circle and businesses. For this reason, this study

investigated the effectiveness of skill certification system for automotive industry in Thailand by using Kirkpatrick's model. However, we should modify the model by incorporating the ideas provided by other researchers.

# Chapter 3

## Literature Review: Meta-analysis of Training Effectiveness and Descriptive Review on Individual and Work Environment Characteristics

This chapter is divided into two parts; the first empirically review training effectiveness by using meta-analysis to investigate the correlation between the four levels of Kirkpatrick's model. The other part of this chapter investigates previous studies on the effect of individual trainee and work environment characteristics on first three levels. To explicate training effectiveness, it is crucial to identify and measure the impacts of individual trainee and work environment characteristics influencing on training outcomes including learning and behavior change or transfer.

### 3.1 Introduction

Training is one of the most important methods for enhancing the productivity and improving knowledge and skills of employees to meet the environmental challenges. Training researchers agree on the importance of training evaluation (e.g., Cascio, 1989; Goldstein, 1993). Organizations often evaluate training effectiveness using one or more of Kirkpatrick's criteria (1994). The four-level of Kirkpatrick model is most extensively accepted and used, as it is simple, clear, and easy to perform as training evaluators expect. The model is still widely used in academic circle and businesses.

Alliger and Janak's (1989) conducted a meta-analytic review of the literature of training effectiveness based on Kirkpatrick's model. They concluded that:

> "Kirkpatrick's model provided a vocabulary and rough taxonomy for criteria. At the same time, Kirkpatrick's model, through its easily adopted vocabulary and rough taxonomy for criteria and number of (often implicit) assumptions, can tend to misunderstandings and overgeneralizations (pp. 331-332)".

There are problems with Kirkpatrick's model about unclear criteria on training. Nonetheless, the Kirkpatrick typology remains by far the most influential and prevalent approach among practitioners (Kirkpatrick, 1996). For this reason, it can still serve as a point of departure for communicating understandings about training criteria (Alliger et al., 1997).

Furthermore, Alliger and Janak (1989) discussed the model in the light of three assumptions that appear to be largely implicit in the mind of researchers and trainers, although to all appearances unintended by Kirkpatrick himself when the model was proposed. Specifically, the following three assumptions appeared: (1) each succeeding level of evaluation criteria is more informative or better in terms of information obtained for the organization than the last, (2) each level is caused by the previous level, and (3) the levels are positively intercorrelated. Each of these three assumptions about Kirkpatrick's model appears to be codified in what has been termed the "hierarchical model" of training evaluation (Hamblin, 1974; Noe & Schmitt, 1986), where favorable outcomes at the lowest criterion level are seen to be necessary for favorable outcomes to occur at the next higher level, and so on (Clement, 1982).

Two meta-analyses of training evaluation studies, Alliger and Janak's (1989) and Alliger et al.'s (1997), investigated the relationship among training criteria by using Kirkpatrick's model. They found little evidence either of substantial correlations between measures at different outcome levels or evidence of the linear causality suggested by Kirkpatrick (1994). Based on these empirical results, they concluded Kirkpatrick's model has

been misunderstood by researcher and practitioners to be hierarchical (Alliger and Janak, 1989; Alliger, Tannenbaun, and Bennett, 1997). After those meta-analyses several studies of training evaluation have failed to confirm the hierarchical relationship of reaction, learning, and behavior to results, although theoretically academics of training evaluation still tend to emphasize the possibility of the link among all four Kirkpatrick's evaluation levels.

Given the significance of training to organizational effectiveness, it is important that researchers and practitioners have a clear understanding of the factors which promote and affect the effectiveness of training beyond the original Kirkpatrick's model. More specifically, the researchers have focused on multiple individual trainee characteristics such as self-efficacy, learning motivation, trainability, job attitudes, personal characteristics, and transfer of training conditions for learning (e.g. Chuang and Tai, 2005; Gist, Schwoerer, and Bavetta, 1989; Gist, Stevens, and Bavetta, 1991; Liao and Tai, 2006; Mathieu, Tannenbaum, and Salas, 1992; Noe, 1986; Noe, and Schmitt, 1986; Tracey, et al., 2001).

Consequently, two main objectives of this study are as follows. First, the current study addresses the limitations in our understanding of the training effectiveness by reviewing the literature, proposing hypotheses, and testing the hypotheses with meta-analysis whenever possible. The other objective of the present study is to address this gap in the training effectiveness literature by descriptive review on individual trainee characteristics and work environment characteristics--self-efficacy, learning motivation, motivation to transfer training, social and organizational support--and the effectiveness of training in organizations. Please note that we do not propose the new framework as a comprehensive replacement for Kirkpatrick's model.

### 3.2 Overview of Training Evaluation Criteria

The choices of approaches and models of training evaluation are primary decision that must be made when evaluating the effectiveness of training. Among others, Kirkpatrick's (1994) four-level model of training evaluation criteria continues to be the most popular. We used this framework because it is conceptually the most appropriate for our purposes (Table 3-1).

**Table 3-1**: Training criteria taxonomies

| Kirkpatrick's taxonomy | Augmented framework |
|---|---|
| Reaction | - Aggregate reaction<br>- Affective reaction<br>- Utility reaction<br>- Difficulty reaction |
| Learning | - Declarative knowledge<br>- Procedural knowledge<br>- Retention |
| Behavior | - Behavior change or transfer |
| Results | - Results |

*Level 1, reactions criteria,* originally was defined as trainees' feelings for and linking of training program. Reaction measures may indicate the trainee's motivation to learn. Reactions were emotionally based opinions. In addition, reaction measures may not be a strong indicator of effective training (Tannenbaum and Yukl, 1992). While positive reactions may not ensure learning, negative reactions probably reduce the possibility that learning occurs. However, reaction measures are the most widely applied evaluation criteria. Alliger et al. (1997)

investigated the difference of reactions criteria in previous studies and classified it into affective and utility judgments. Affective judgments measure the extent to which a participant "like" or was satisfied with different components of the training. Utility judgments attempt to ascertain the perceived utility value, or usefulness, of training for subsequent job performance.

*Level 2, learning criteria,* originally refers to the knowledge, skills, and attitude acquired by trainees. Evaluation on learning aims at understanding trainees' comprehension of instruction, principles, ideas, knowledge and skills from training. Additionally, Alliger and Janak (1989) defined learning as the "principle, facts and techniques understood and absorbed by the trainees. No changes in behavior can occur unless one or more of learning objectives have been accomplished at least partly (Kirkpatrick, 1994). Among many aspects of knowledge, however, we include three subcategories of learning: (1) declarative knowledge immediately after training, (2) procedural knowledge, or performance of trained tasks immediately after training, and (3) knowledge that is assessed at a later time (knowledge retention).

*Level 3, behavior,* defined as transferring knowledge, skill, and attitudes learned during training to the job (Kirkpatrick, 1994). Although learning and behavioral criteria are conceptually linked, researches have been limited. A measure was classified as indicating on-the-job performance whenever it appeared that the measure was not only taken some time after training (Alliger et al., 1997).

*Level 4, results* were defined as the final results that occurred because the trainees attended the program of training (Kirkpatrick, 1994). These could include increased production, improved quality, customer satisfaction, decreased costs, reduced frequency and severity of accidents, increased sales, reduced turnover, higher commitment, and profits.

However, many organizations have limitation for gathering Level 4 data (Shelton and Alliger, 1993; Tannenbaum and Woods, 1992).

Additionally, the problem with Kirkpatrick's framework is an ambiguous criteria of training evaluation. Some indicators such as employee attendance or scrap page rates could be categorized equally well as behavior (Level 3) or results (Level 4) criteria (Alliger et al., 1997). In any case, as mentioned below, only one study provided correlations that are categorized as being based on Level 4 criteria, so this study has not focused on this level in meta-analysis.

## 3.3 Method

### 3.3.1 Literature Search

For the present meta-analysis study, we reviewed the published training effectiveness and development literature from 1980 to 2012. The literature search was conducted to identify empirical studies that involved an evaluation of training program or measured some aspects of the effectiveness of training. This search process started with a search of computer databases including EBSCOhost using the following key words: *training effectiveness, training evaluation, and training transfer.* Specifically, this study reviewed Academy of Management Journal, Human Resource Development International, Human Resource Development Quarterly, Human Resource Management, International Journal of Information Management, International Journal of Management, International Journal of Training and Development, Journal of Applied Psychology, Journal of Occupational and Organizational Psychology, Military Psychology, Personnel Psychology, Public Personnel Management Journal, and Social Behavior and Personality. Table 3-2 shows the number of articles found by journal and category. On the basis of the literature search, a total of 24 published articles were included in

the meta-analysis. Of the 24 studies reported intercorrelations among two or more levels of evaluation. The remaining 19 studies contributed effect sizes to only reaction and learning criteria. 21 studies reported the intercorrelations between learning and behavior. Only one article in International Journal of Training and Development, reported the intercorrelations between behavior and results criteria.

**Table 3-2**: Prior studies to be used for meta-analysis by journal and level of criteria

| Journal | No. of studies of correlations between levels of evaluation | | |
|---|---|---|---|
| | Level 1 and 2 | Level 2 and 3 | Level 3 and 4 |
| Academy of Management Journal | 1 | 1 | |
| Human Resource Development International | | 1 | |
| Human Resource Development Quarterly | 3 | 4 | |
| Human Resource Management | | 1 | |
| International Journal of Information Management | 1 | 1 | |
| International Journal of Management | 1 | 1 | |
| International Journal of Training and Development | 4 | 2 | 1 |
| Journal of Applied Psychology | 3 | 5 | |
| Journal of Occupational and Organizational Psychology | 1 | 1 | |
| Military Psychology | 2 | 1 | |
| Personnel Psychology | 1 | 2 | |
| Public Personnel Management Journal | 1 | 1 | |
| Social Behavior and Personality | 1 | | |
| Total | 19 | 21 | 1 |

For the descriptive review, this study focuses on the major empirical studies from 1980 to 2012 that were undertaken to test the effects of individual trainee and work environment

characteristics on training outcomes including learning and behavior change or transfer. It excludes technical reports and studies reporting qualitative or descriptive findings or meta-analysis results, using samples of secondary or primary schools' students and children and examining variables that were not included in this study. Major articles referred to our scope were published in some major organizational behavior journal such as *Human Resource Development Quarterly, International Journal of Training and Development, Personnel Psychology, Journal of Applied Psychology, Journal of Occupational and Organizational Psychology*, etc. and some areas (e.g. educational psychology) were excluded in this study. In addition, four independent factors are identified which were most commonly examined in the past decades. These factors are categorized as individual trainee characteristics (self-efficacy, learning motivation, and motivation to transfer) and social support as work environment characteristic.

### 3.3.2 Coding for Meta-analysis

Each of the studies indentified was coded as follows: (a) type of reaction (aggregate, affective, utility, and difficulty), (b) type of learning (declarative knowledge, procedural knowledge, and retention), (c) sample size (*N*), and (d) effect sizes. For coding of effect sizes, we obtained Pearson's correlation coefficient directly from the majority of studies or computed *r* from existing statistics such as *d* by using Comprehensive Meta-Analysis Version 2—a computer program for meta-analysis--.

## 3.4 Results of Meta-analysis

The results of the meta-analysis are presented in Table 3-3 and Figure 3-1 to 3-8. Aggregate reaction tended to correlate positively with learning (0.293, $p < .001$), although two studies were found that the aggregate of reaction do not correlate with retention of learning.

Moreover, the result of a disaggregated scale of affective, utility, and difficulty reaction show insignificant relationships with learning.

In addition, the results of declarative knowledge and procedural knowledge show significant relationships with behavior ($r = 0.330$, $r = 0.177$ respectively, $p < 0.001$). Based on three studies correlation between retention of learning and behavior ($r = 0.171$, $p < 0.05$).

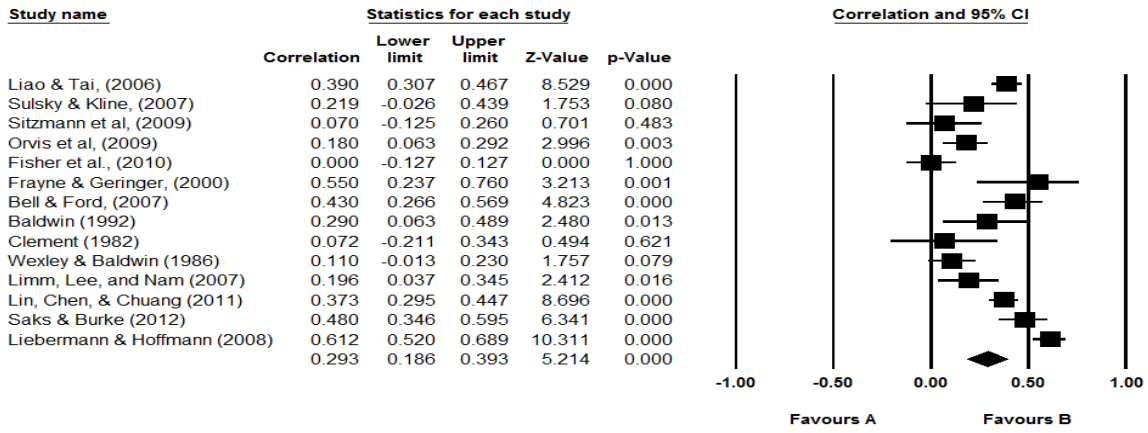
**Table 3-3**: Mean sample-size weighted correlations among training criteria

| | | Level 2 | | | | Level 3 Behavior | |
|---|---|---|---|---|---|---|---|
| | | Learning | | Retention | | | |
| | | *r* | n | *r* | n | *r* | n |
| Level 1 Reaction | - Aggregate reaction | 0.293*** | 14 | -0.020 | 2 | | |
| | - Affective reaction | 0.036 | 4 | | | | |
| | - Utility reaction | 0.129 | 5 | | | | |
| | - Difficulty reaction | -0.348 | 2 | | | | |
| Level 2 Learning | - Declarative knowledge | | | | | 0.330*** | 4 |
| | - Learning (procedural knowledge) | | | | | 0.177*** | 17 |
| | - Retention | | | | | 0.171* | 3 |

*$p < 0.05$, ***$p < 0.001$*

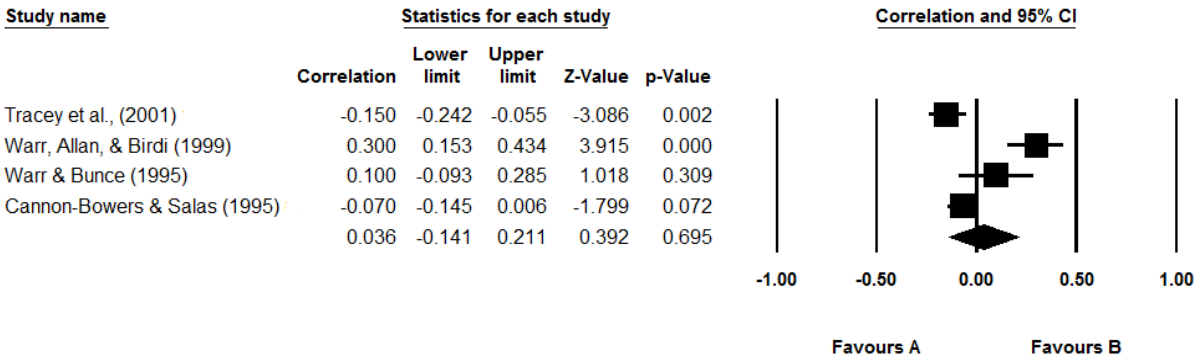
*Note: n* is number of studies combined in calculating each mean correlation. The correlation between behavior and results cannot be reported in this table because the limitation of number of study, we found only one study indicated the correlation concerned.

**Figure 3-1:** Mean sample-size weighted correlation between aggregate reaction and learning (n = 14)




Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-2:** Mean sample-size weighted correlation between affective reaction and learning (n = 4)

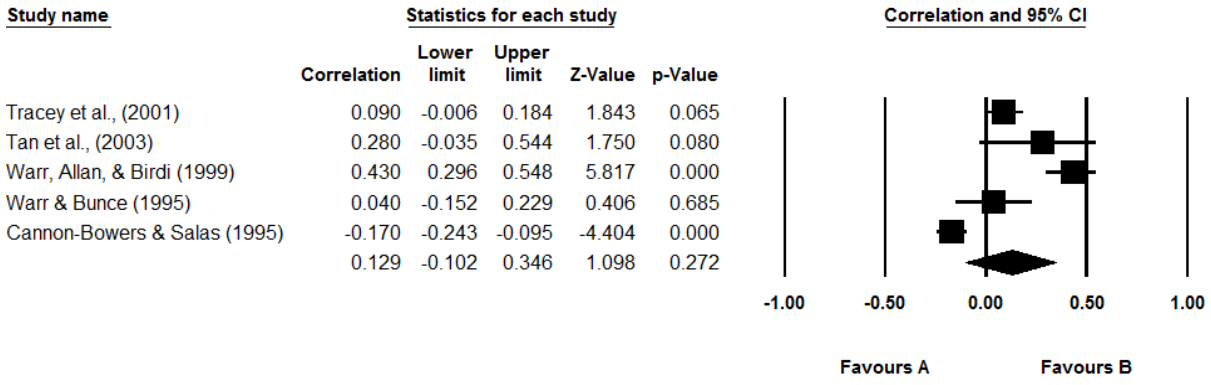


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Tracey et al., (2001) | -0.150 | -0.242 | -0.055 | -3.086 | 0.002 |
| Warr, Allan, & Birdi (1999) | 0.300 | 0.153 | 0.434 | 3.915 | 0.000 |
| Warr & Bunce (1995) | 0.100 | -0.093 | 0.285 | 1.018 | 0.309 |
| Cannon-Bowers & Salas (1995) | -0.070 | -0.145 | 0.006 | -1.799 | 0.072 |
| | 0.036 | -0.141 | 0.211 | 0.392 | 0.695 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-3:** Mean sample-size weighted correlation between utility reaction and learning (n = 5)

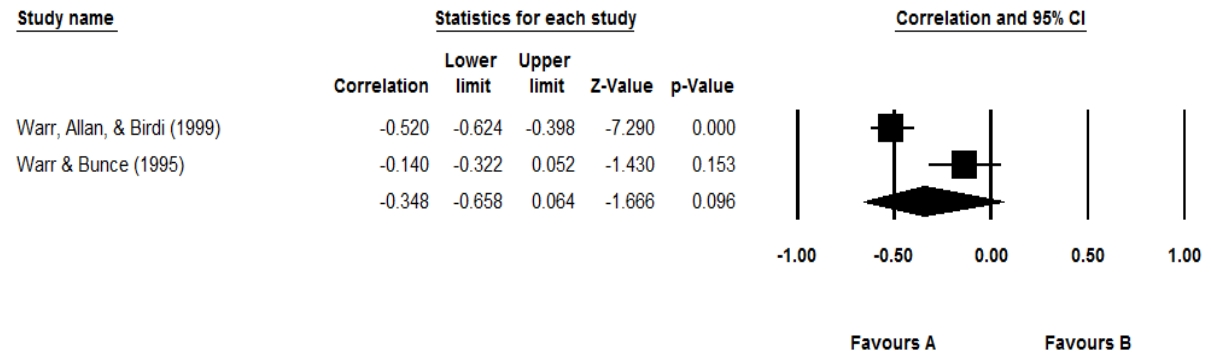


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Tracey et al., (2001) | 0.090 | -0.006 | 0.184 | 1.843 | 0.065 |
| Tan et al., (2003) | 0.280 | -0.035 | 0.544 | 1.750 | 0.080 |
| Warr, Allan, & Birdi (1999) | 0.430 | 0.296 | 0.548 | 5.817 | 0.000 |
| Warr & Bunce (1995) | 0.040 | -0.152 | 0.229 | 0.406 | 0.685 |
| Cannon-Bowers & Salas (1995) | -0.170 | -0.243 | -0.095 | -4.404 | 0.000 |
| | 0.129 | -0.102 | 0.346 | 1.098 | 0.272 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-4:** Mean sample-size weighted correlation between difficulty reaction and learning (n = 2)

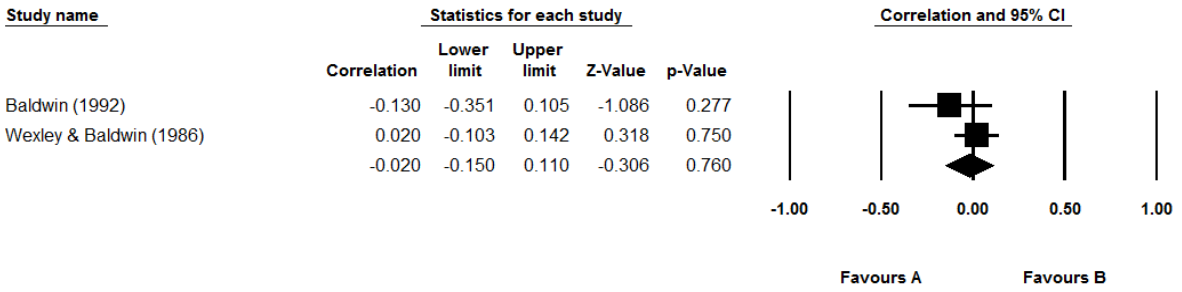


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Warr, Allan, & Birdi (1999) | -0.520 | -0.624 | -0.398 | -7.290 | 0.000 |
| Warr & Bunce (1995) | -0.140 | -0.322 | 0.052 | -1.430 | 0.153 |
| | -0.348 | -0.658 | 0.064 | -1.666 | 0.096 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-5:** Mean sample-size weighted correlation between aggregate reaction and retention (n = 2)

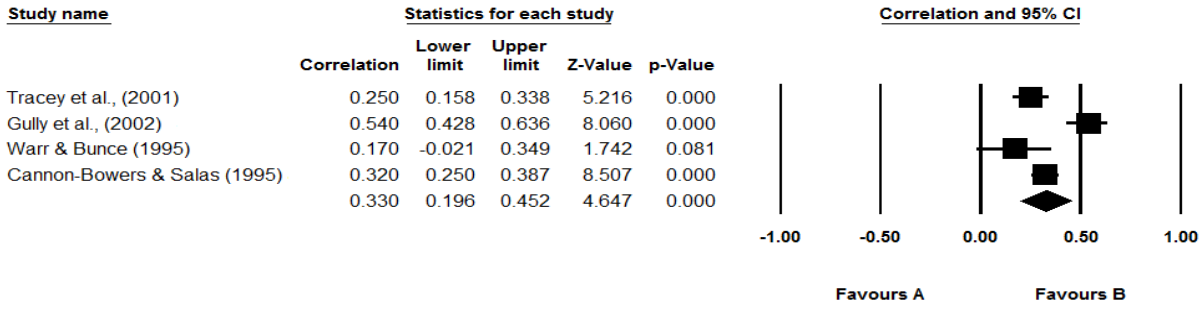


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Baldwin (1992) | -0.130 | -0.351 | 0.105 | -1.086 | 0.277 |
| Wexley & Baldwin (1986) | 0.020 | -0.103 | 0.142 | 0.318 | 0.750 |
| | -0.020 | -0.150 | 0.110 | -0.306 | 0.760 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-6:** Mean sample-size weighted correlation between declarative knowledge and behavior (n = 4)

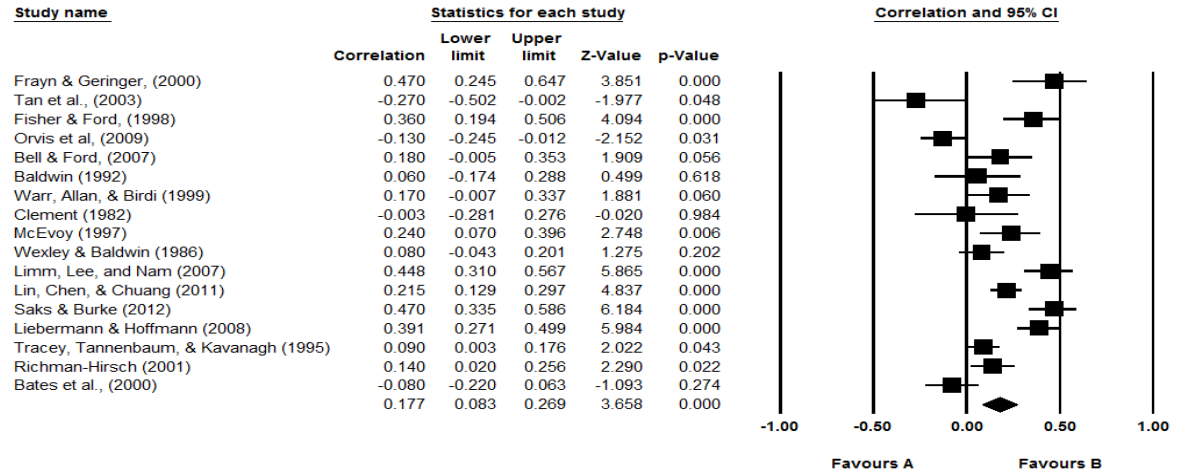


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Tracey et al., (2001) | 0.250 | 0.158 | 0.338 | 5.216 | 0.000 |
| Gully et al., (2002) | 0.540 | 0.428 | 0.636 | 8.060 | 0.000 |
| Warr & Bunce (1995) | 0.170 | -0.021 | 0.349 | 1.742 | 0.081 |
| Cannon-Bowers & Salas (1995) | 0.320 | 0.250 | 0.387 | 8.507 | 0.000 |
| | 0.330 | 0.196 | 0.452 | 4.647 | 0.000 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-7:** Mean sample-size weighted correlation between learning (procedural knowledge) and behavior (n = 17)

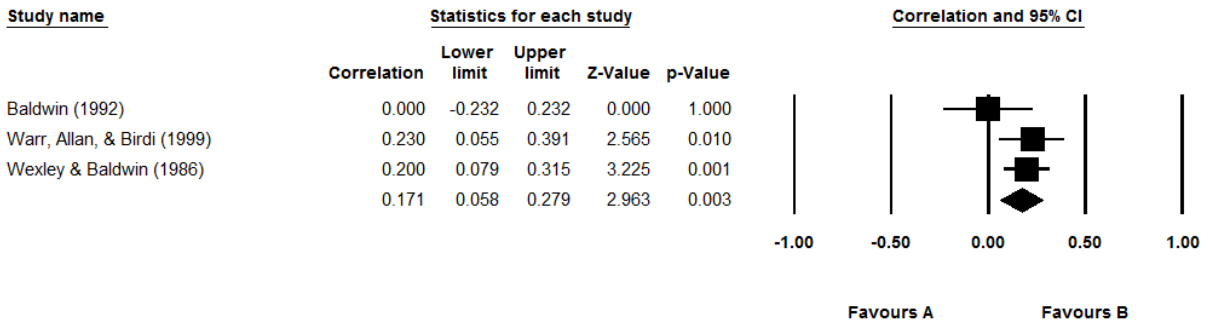


| Study name | Correlation | Lower limit | Upper limit | Z-Value | p-Value |
|---|---|---|---|---|---|
| Frayn & Geringer, (2000) | 0.470 | 0.245 | 0.647 | 3.851 | 0.000 |
| Tan et al., (2003) | -0.270 | -0.502 | -0.002 | -1.977 | 0.048 |
| Fisher & Ford, (1998) | 0.360 | 0.194 | 0.506 | 4.094 | 0.000 |
| Orvis et al, (2009) | -0.130 | -0.245 | -0.012 | -2.152 | 0.031 |
| Bell & Ford, (2007) | 0.180 | -0.005 | 0.353 | 1.909 | 0.056 |
| Baldwin (1992) | 0.060 | -0.174 | 0.288 | 0.499 | 0.618 |
| Warr, Allan, & Birdi (1999) | 0.170 | -0.007 | 0.337 | 1.881 | 0.060 |
| Clement (1982) | -0.003 | -0.281 | 0.276 | -0.020 | 0.984 |
| McEvoy (1997) | 0.240 | 0.070 | 0.396 | 2.748 | 0.006 |
| Wexley & Baldwin (1986) | 0.080 | -0.043 | 0.201 | 1.275 | 0.202 |
| Limm, Lee, and Nam (2007) | 0.448 | 0.310 | 0.567 | 5.865 | 0.000 |
| Lin, Chen, & Chuang (2011) | 0.215 | 0.129 | 0.297 | 4.837 | 0.000 |
| Saks & Burke (2012) | 0.470 | 0.335 | 0.586 | 6.184 | 0.000 |
| Liebermann & Hoffmann (2008) | 0.391 | 0.271 | 0.499 | 5.984 | 0.000 |
| Tracey, Tannenbaum, & Kavanagh (1995) | 0.090 | 0.003 | 0.176 | 2.022 | 0.043 |
| Richman-Hirsch (2001) | 0.140 | 0.020 | 0.256 | 2.290 | 0.022 |
| Bates et al., (2000) | -0.080 | -0.220 | 0.063 | -1.093 | 0.274 |
| | 0.177 | 0.083 | 0.269 | 3.658 | 0.000 |



Source: Authors' own calculations by using comprehensive meta-analysis program

**Figure 3-8:** Mean sample-size weighted correlation between retention and behavior (n = 3)




Source: Authors' own calculations by using comprehensive meta-analysis program

### 3.5 Discussion

Fifty one correlations were identified in this meta-analysis. The results indicated correlations between the various types of training criteria. Between reaction and learning, only aggregate reaction has been correlated with learning, although the affective reaction did not correlate with learning. These results are consistent with meta-analysis by Alliger et al. (1997). They found that a combined scale of affective and utility reactions had a significant relationship to immediate learning (r = .14) and affective reactions to training did not have significant relationship to immediate learning. However, the results of this study indicated that utility reaction has an insignificant relationship to learning. The result was contrast with Alliger et al., (1997). They found that utility reactions have a modest but significant relationship to immediate learning (r = .26). Furthermore, this study examined the correlation between difficulty reaction and learning but the result was also insignificant. In addition, the result of this study found that aggregate reaction has not been correlated with retention. These were additional analyses beyond Alliger et al., (1997).

As discussed above, previous meta-analysis results have been inconclusive for the purpose of investigating the relationship between the criteria of reaction and learning.

Therefore, Chapter 5 proposes to investigate the two facets of reactions, that is, affective and utility reactions. We collected measures of reaction and learning in order to determine if the training program was effective and examine the pattern of relations among the different types of criteria.

Between learning and behavior change, declarative knowledge has been correlated with behavior change after training. The result supported Alliger et al. (1997). Furthermore, both criteria of learning, procedural knowledge and retention have positive correlations with behavior. We suspect that trainees' knowledge and skills may continue to improve after training because of the opportunities for practice that naturally occur on the job. Such practice opportunities are likely to be valuable for knowledge and skills development but may not occur frequently enough for trainees to have sufficient practice opportunities within just the 1st month following training for immediate evaluation (May and Kahnweiler, 2000), when posttraining evaluation measures are often taken.

### 3.6 An Individual Trainee and Work Environment Characteristics

Theory and empirical research suggest individual trainee and work environment characteristics influence the effectiveness of training (e.g. Bandura, 1986; Mathieu et al., 1993; Tannenbaum et al., 1991; Tannenbaum and Yukl,, 1992). This review reveals three individual trainee characteristics and one work environment characteristic (self-efficacy, learning motivation, motivation to transfer training, social and organizational support) that have been examined the relationships with training outcomes. Focusing on these variables has its root in the concept of trainability. Trainability is defined as "the degree to which training participants are able to learn and apply the material emphasized in the training program" (Noe and Schmitt, 1986 p.498). This definition was expanded by Wexley and Latham's (1981).

They described trainability as a function of ability, motivation and environmental favorability [Trainability = *f*(Ability, Motivation and environmental favorability)]. Notwithstanding, further empirical testing of these characteristics was very rare in earlier transfer studies. During the 1980s, the study of these characteristics had been increasing (Cheng and Ho, 2001).

More specifically, the two stages are described by Cheng and Ho (2001) that (1) learning is the process of mastering the content of a training program; and (2) transfer outcomes are those attainments made by the trainees when they apply what they have acquired in a training context back to the job, which can benefit both the trainees and the organization. Some examples of such attainments are behavior change, perceived posttraining attitudes, perceived transfer of training, job performance, etc.

**Table 3-4**: A summary of the findings: the effects of individual trainee and work environment characteristics on training outcomes including learning and transfer

| | | Learning | Transfer outcomes |
|---|---|---|---|
| Individual trainee characteristics | - Self –efficacy | +(1), ns(1) | +(3), ns(3) |
| - Motivational variables | - Learning motivation | +(6), ns(3) | +(1), ns(1) |
| | - Motivation to transfer | nt | +(3), ns(1) |
| Work environment characteristics | - Social support | nt | +(6), ns(2) |

***Note:*** + = significant and positive relationship between the variables; - = significant but negative relationship between the variables; ns = non-significant relationship between the variables; nt = not tested. Numbers in parentheses are the total number(s) of the relationship that were tested in the reviewed empirical studies.

Table 3-4 summarizes the findings of the studies which were published from 1980 to 2012. The first horizontal row consists of the two dependent variables in the transfer process. The first two vertical columns on the left-hand side of the table list the categories and four

independent variables respectively. The major studies of the relationships between individual trainee characteristics including motivational variables, and work environment characteristic, and transfer process (as shown in Table 3-4) are described in the following.

### 3.6.1 Individual Trainee Characteristics

#### *1) Self-efficacy*

The effects of self-efficacy on transfer have been widely studied recently. Self-efficacy is defined as "people's judgments of their capabilities to organize performances" (Bandura, 1986, p. 391). It is clear that trainees with a high level of confidence in attaining anticipated performance and behavior change will be more likely to apply what they have learned from training on the jobs. Within the framework of social cognitive theory, self-efficacy can be conceptualized as relevant before, during, and after training. If trainee's belief in his or her ability to learn and succeed in training, it can be viewed as a prerequisite for taking advantage of training. Empirically, self-efficacy was shown to be positively related to pretraining motivation (Quinones, 1995), learning in training (e.g., Colquitt, LePine, and Noe, 2000; Gist, Schwoerer, and Rosen, 1989; Gist, Stevens, and Bavetta, 1991; Martocchio, 1994; Simmering and Posey, 2009), training performance in various training programs (Gist, 1989; Gist et al., 1991; Tannenbaum et al., 1991) and posttraining behavior (Latham and Frayne, 1989; Gist, 1989; Mathieu et al., 1992; Saks, 1995; Tannenbaum et al., 1991), transfer performance (Ford et al., 1998) and skill maintenance (Stevens and Gist, 1997). Seyler et al. (1998) further found that trainees with a high level of confidence to training were more motivated to transfer the newly acquired knowledge and skills.

#### *2) Motivational Factors*

Many motivational factors proposed to affect the process in which training outcomes arise were tested. This is because trainees with inadequate motivation are likely to be poor in

mastering the training content and subsequent training performance. The pretraining motivation was related to actual learning in a training program (Baldwin et al., 1991; Mathieu et al., 1992) and subsequent training performance (Mathieu et al., 1992; Martocchio, 1992). Specifically, trainees who perceived training as having good job and career utility were more likely to be motivated to learn (Clark et al., 1993) and those who perceived utility reaction of training to be relevant had higher level of immediate skill transfer (Axtell et al., 1997).

Learning motivation or motivation to learn refers to the desire of the trainee to learn the contents of the training program (Noe, 1986). In the Cannon-Bowers model of training effectiveness, motivation to learn is hypothesized to be positively related to knowledge acquisition. Thus learning motivation is important for acquiring fundamental levels of knowledge (e.g., Mathieu et al., 1992; Randel, Main, Seymour, and Morris, 1992; Traci et al., 2009; Zazanis, Zaccaro, and Kilcullen, 2001). Furthermore, Colquitt et al. (2000) came to the conclusion that trainee learning motivation was significantly related to both declarative knowledge and skill acquisition.

In a training program, motivation can influence the willingness of a trainee to participate in the training and also affect whether or not a trainee utilizes his (her) learning on the job (Baldwin and Ford, 1988). Motivation to transfer is the learner's intended efforts to utilize knowledge and skills learned in training setting to a real world work situation (Noe, 1986). In previous empirical studies, such as those by Axtell, Maitlis, and Yearta (1997) and Noe (1986), motivation to transfer is described as the trainee's desire to use the knowledge and skills that have been learned in a training program on the job. Moreover, Axtell, et al. (1997) found motivation to transfer was a significant predictor of positive transfer that trainees felt they had achieved after participation in the training. Therefore, it is evident that motivation to transfer plays an important role in improving work behavior.

However, the previous empirical studies did not focus on learning motivation and motivation to transfer as moderating effects on the relationship between training outcomes, specifically on the relationship of reaction, learning, and behavior. Therefore, Chapter 6 of this dissertation focuses on learning motivation and motivation to transfer as important moderator variables in the relationship concerned.

### 3.6.2 Work Environment Characteristic

Although practitioners stress the importance of the work environment in creating positive transfer, empirical research focusing on this dimension was limited (Baldwin and Ford, 1988). More studies based on work-environment variables should focus on the supports-in-organization variables which come from the concept of social support, because that is said to be influential when employees believe that other client systems in the organization (e.g. their supervisors and peers) provide them with opportunities for practicing new knowledge and skills in the job settings (Noe, 1986). When trainees have plenty of chances to apply what they have learned to their jobs, a larger amount of training content can be transferred (Ford et al., 1992). Some researchers have used the term "transfer climate" to represent the social supports from the organization (e.g. Tracey, 1995). Basically, there are four major sources of social support—subordinate, peer, supervisor and top management (Facteau et al., 1995). Among them, top management support is provided by both interpersonal relationship and institutional measures at the organizational level.

One focus in the empirical studies was on the type of support providers, such as supervisors or peers. The previous studies confirmed that support from supervisors and peers is the work environment variable that has the largest effect on the transfer (e.g. Awoniyi et al., 2002; Baldwin and Ford, 1988; Bates et al., 2000; Clarke, 2002; Cohen, 1990; Cromwell and Kolb, 2004; Elangovan and Karakowsky, 1999; Gregoire, Propp, and Poertner, 1998;

Gumuseli and Ergin, 2002; Holton et al., 1997; Huczynski and Lewis, 1980; Quinones et al., 1995; Richman-Hirsch, 2001; Russ-Eft, 2002; Salas and Cannon-Bowers, 2001; Smith-Jentsch, Salas, and Brannick, 2001; Taylor, 1992; Xiao, 1996). Moreover, subordinates' support (Facteau et al., 1995) and management support (Brinkerhoff and Montesino, 1995) could facilitate transfer of training. Brinkerhoff and Montesino (1995) also found that strong relationships built by involved parties (i.e. trainers, trainees and managers) before, during, and after training could ensure a positive transfer.

Although prior research confirmed the importance of supervisor, co-worker and organizational support for transfer of training, they did not investigate social and organizational support as moderator into the training effectiveness by using two level of Kirkpatrick's model: learning and behavior. Therefore, Chapter 7 of this dissertation focused on the specific dimension of social and organizational support as the moderating variable influencing on the relationship between learning and behavior. Because of social and organizational support factors have become increasingly the important indicator for transfer of training among researchers. This study identified social support includes supervisor and co-worker support. Supervisor support has the critical task of providing reinforcement for learning on the job. Co-worker support focuses predominantly on supporting the use of learning on the job. Organizational support focuses on organization provision of material goods such as transportation, money, or physical assistance to employees for supporting the transfer of training on the workplace.

### 3.7 Conclusions

This chapter has been written to highlight some recent major studies of training effectiveness. The results of meta-analysis found that only aggregate of reaction tended to

correlate positively with learning, but other criteria of reaction showed insignificant relationships with learning. In addition, learning including declarative knowledge, procedural knowledge, and retention had significant relationships with behavior. However, the previous meta-analysis results have been inconclusive for the purpose of investigating the relationship between the criteria of reaction and learning. Therefore, Chapter 5 of this dissertation proposes to investigate the measures of reaction into two facets (affective and utility reactions) in order to determine if the training program was effective and examine the pattern of relations among the different types of criteria.

The results of descriptive review on individual trainee and work environment characteristics indicated that self-efficacy, learning motivation, motivation to transfer and social support have direct effects on the training effectiveness. However, little previous empirical studies focused on those characteristics as moderators on the relationships between training outcome variables, specifically on the relationship of reaction, learning, and behavior. Therefore, Chapter 6 of this dissertation focuses on self-efficacy, learning motivation, motivation to transfer and social support as important moderator variables in the process concerned.

Consequently, this study focused three types of social support as the work environment characteristic including supervisor, co-worker or peer, and organizational support. This is because social is one of the most important indicators for enhancing on transfer process. Thus, Chapter 7 of this dissertation focused in the specific dimension of social and organizational support as the moderating variable on the relationship between learning and behavior.

# Chapter 4

# Overview of Thai Automotive Industry, Skill Certification System, and Research Methodology

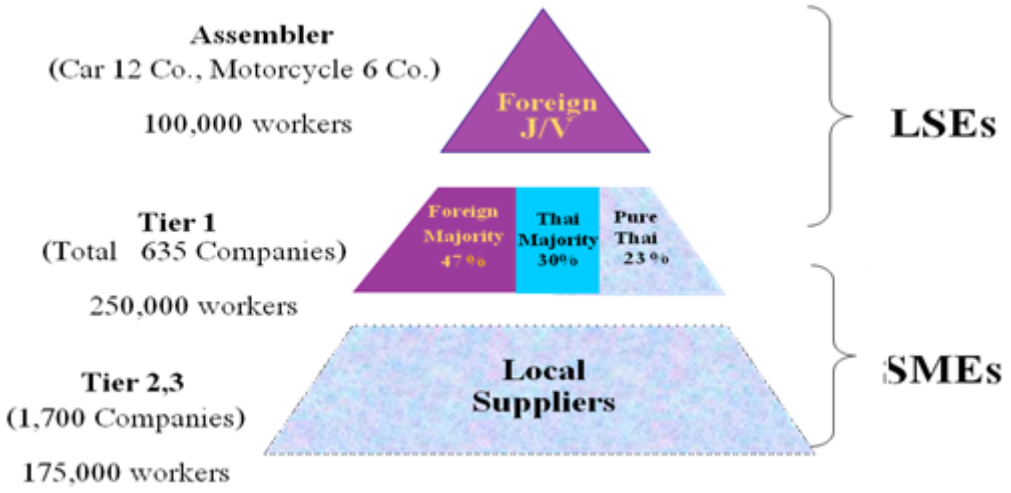
Before going into the research methodology, this chapter firstly would like to overview background of Thai automotive industry and the skill certification system in Thailand. Then the next section is research methodology shows research framework, data and sample, procedure, measures and method of analysis.

## 4.1 Background of Thai Automobile Industry

The automotive industry in Thailand started in the early 1960s under an import substitution policy and a revision of the investment promotion law to encourage automotive assembly in Thailand. As a result of government policies inducement incentive, foreign assemblers entered into the country and started their production to serve domestic market. Local production and supporting industries have been developed and multinational car manufacturers gradually expanded their production and started export during the period 1991-1996. This period is also the first period that cars produced in Thailand were exported to the world market, especially one-ton pick-up trucks. Thailand has become the second largest production base of pick-up trucks after the US. Despite the country was affected by the 1997-98 economic crisis, several assemblers restructured their business and made a strategic decision to use Thailand as one of their global production bases (Poapongsakorn and Techakanont, 2008).

Currently firms in the industry can be classified into three groups which are 12 car assemblers, approximately 635 1st-tier suppliers, and around 1,700 2nd and 3rd-tiers suppliers which include the supporting companies. Most of them are small and medium size companies (See Figure 4-1). Most assemblers are subsidiaries of the transnational corporations (TNCs). They are dominated by Japanese TNCs and the big 3 US car companies, namely Chrysler[1], General Motor (GM) and Ford. Their prime objective is to produce and export one-ton pickups from Thailand. Due to a sufficient pool of qualified engineers and technicians, and an extensive supplier network enabling integrated production, Thailand is clearly the strongest automotive production base in Southeast Asia (Thai Automotive Institute (TAI), 2012).

**Figure 4-1:** Structure of manufacturers in the automotive industry in Thailand




Source: Thai Automotive Institute (TAI), 2012.

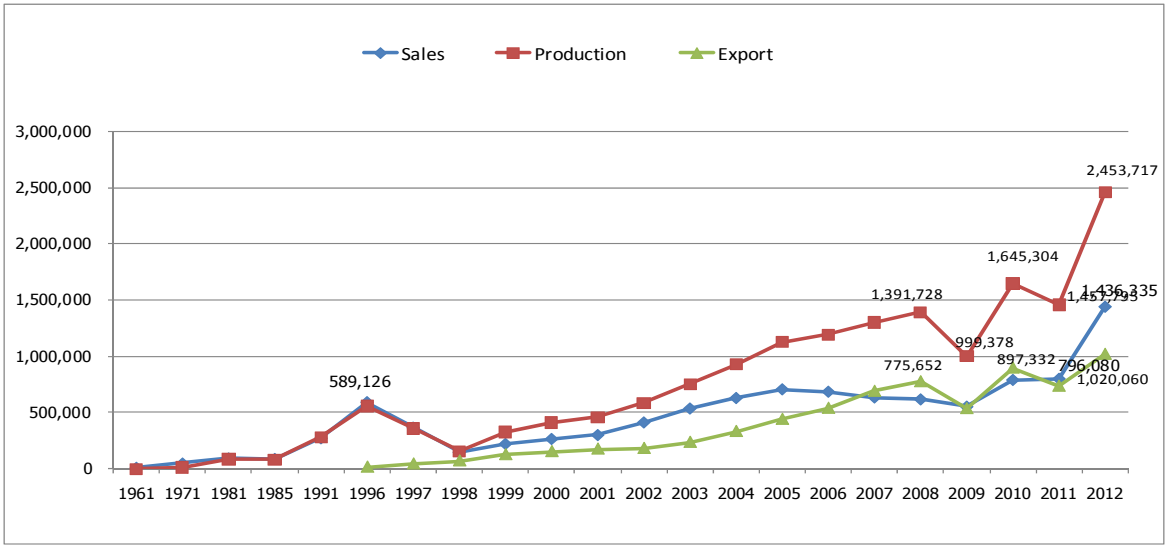
Thailand's automotive sector has become a part of the global production network (GPN) of many car manufacturers. Production capacity expanded considerably after 2000. Completely built-up (CBU) vehicles and completely knocked-down (CKD) kits are produced

[1] Joint venture of Chrysler was dissolved in 2007.

by locally based suppliers, and have been a major export product since 2000. Automobile production in Thailand surpassed one million units in 2005, and in 2010 reached a new record high at 1.6 million units. In 2007, annual production was 1,301,149 units and total export was 690,100 units (see Figure 4-2). This was an important milestone for the Thai automobile industry because export volume exceeded domestic sales. After only 40 years of development, the Thai automobile sector fully becomes an export-oriented industry.

Annual production of one-ton pickup trucks exceeds one million units for the first time. In 2011, domestic production and exports dropped because of two natural disasters, the tsunami in Japan and flooding in Thailand. Nevertheless, production and sales in Thailand recovered quickly. Domestic production reached 2.4 million units, sales 1.4 million and exports 1.0 million in 2012 (see Figure 4-2). The automotive industry has contributed significantly and increasingly on the Thai economy in terms of value added and employment, especially since the years 2001 (Thai Automotive Institute (TAI), 2013). Total labour employed in the auto industry was about 310,000 persons in 2011 (see Table 4-1).

**Figure 4-2:** Thailand's production, sales, and exports (1961-2012)




Source: Thai Automotive Institute (TAI), 2012

**Table 4-1:** Number of labor employed in the automotive industry

| Industry | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Automobile assembly | 29,571 | 38,144 | 34,966 | 29,083 | 44,876 | 41,866 | 39,727 | 38,307 | 34,947 | 50,207 | 49,920 |
| Body parts | 3,996 | 8,154 | 21,972 | 10,749 | 20,295 | 13,193 | 14,399 | 8,774 | 7,224 | 14,153 | 14,794 |
| Autopart and component | 62,251 | 67,175 | 75,336 | 86,885 | 109,037 | 139,689 | 176,600 | 184,314 | 157,956 | 158,668 | 231,761 |
| Motorcycle assembly | 14,437 | 15,808 | 22,634 | 33,677 | 20,772 | 26,405 | 25,446 | 26,820 | 20,098 | 19,329 | 18,327 |

Source: Office of the National Economic and Social Development Board (NESDB)

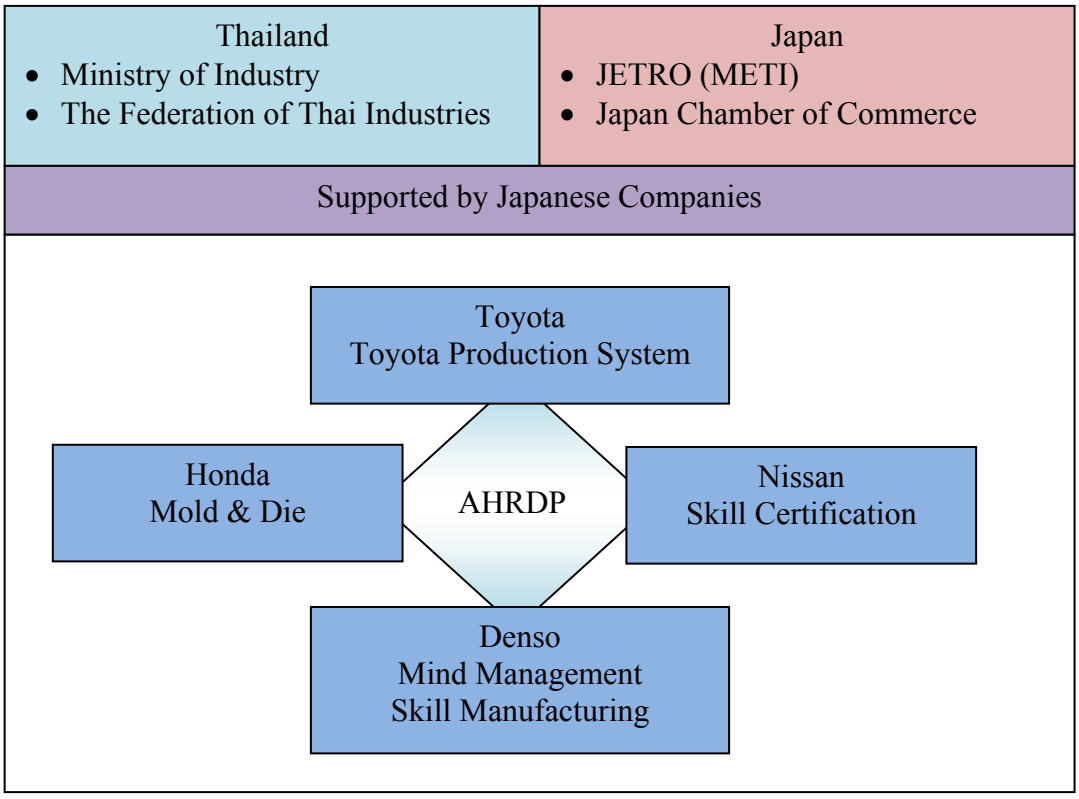
### 4.2 Automotive Human Resource Development Project (AHRDP)

Thai automotive industry is dominated by Japanese affiliated automakers, which hold more than 80 percent market share in vehicle production and sales. Consequently firms of Thai automotive industry have faced more serious international competition. Under these circumstances, even second and third tier auto parts manufacturers are required to improve their competitiveness in terms of quality, delivery, and cost reduction. To accomplish these goals, development and accumulation of capable human resources have become more important management objective. With a focusing on lower tier Thai local autoparts manufacturers, both public and private sectors in Thailand and Japan, with concerned efforts, started Automotive Human Resource Development Program (AHRDP) in 2006 to support HRD for auto parts manufacturers in Thailand, particularly pure Thai and Thai majority firms.

AHRDP was implemented from 2006 to 2012, as part of the Japanese Official Development Assistance (ODA) program, in cooperation with the Thai government and private sectors in both countries. AHRDP has been operated under the public-private partnership participated by stakeholders from both Thailand and Japan, such as Japan External Trade Organization (JETRO), Japanese Chambers of Commerce, Bangkok (JCCB), Ministry of Industry, Thailand (MOI), Federation of Thai Industries (FTI), Thai Auto-Parts

Manufacturers Association (TAPMA), and four major Japanese firms in automotive industry including Toyota, Honda, Nissan, and Denso. As each firm decided to focus on the area of one's strength, four firms are taking production management, mold and die technology, manufacturing skill and mind formation, and skill certification system (see Figure 4-3). After the training, these trainees would be trainers. They transfer acquired skill and know-how to employees in local firms and consequently develop human resources at the broader industry level.

**Figure 4-3:** Automotive Human Resource Development Project (AHRDP)




Source: Thai Automotive Institute (TAI), 2012

The case of the present study, the skill certification system for the automotive industry in Thailand, was one of the sub-programs under the AHRDP and is expected to be very significant because of its potential impact on the whole industry. Specifically for the skill

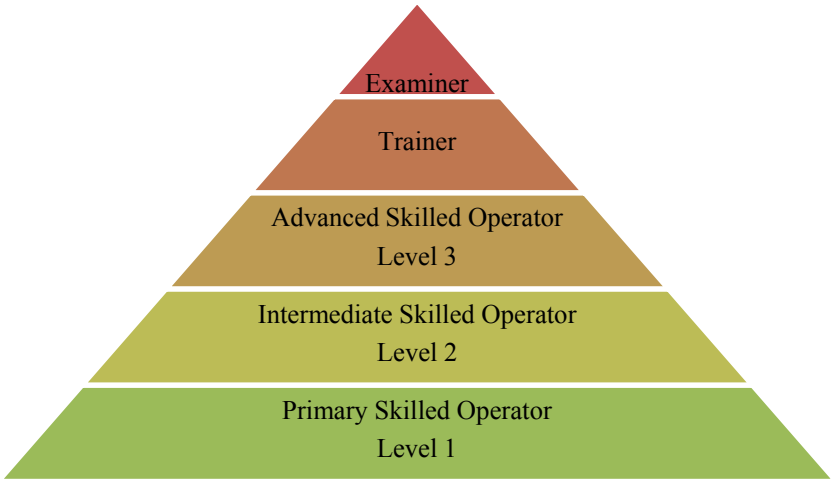
certification system, at the start, Japanese experts from an automotive assembler, Nissan, supported knowledge transfer to local prospective examiners and trainers. They in turn transferred acquired skills and know-how to employees in local firms through training and examination. Through 2012, 363 people were certified in sixteen subjects: (1) die and mold finishing, (2) mechanical assembly finishing, (3) lathe with numerical control, (4) milling with numerical control, (5) handwritten mechanical drawing, (6) mechanical drawing by CAD, (7) electronic device assembly, (8) sequence control, (9) hydraulic system adjustment, (10) mechanical maintenance, (11) electrical maintenance, (12) metal press work/stamping, (13) plastic injection, (14) machining (lathe, milling), (15) ferrous casting, and (16) pneumatic circuits and apparatus device assembling. All of those subjects included theoretical and practical sessions.

The skill certification system for automotive industry has divided the level of certificate into 5 levels including: trainee (level 1, 2, and 3), trainer, and examiner (see Figure 4-4). In addition, the training and testing process of skill certification system is below as figure 4-5. The program for participants consists of skill training and tests. In the training, they learned the related issues both for written exam and practical skill test for one week. Afterwards they will take written exam and practical skill test. After passing the skill certification exam, the participants should have the basic knowledge and skills on different level of skill certification system as following:

- Level 1: Primary skilled operators, the participants who passed the skill certification exam on this level have the knowledge and skills relevance to the measures, criteria, and the order for doing the job. Furthermore, they can work the task assigned by themselves.

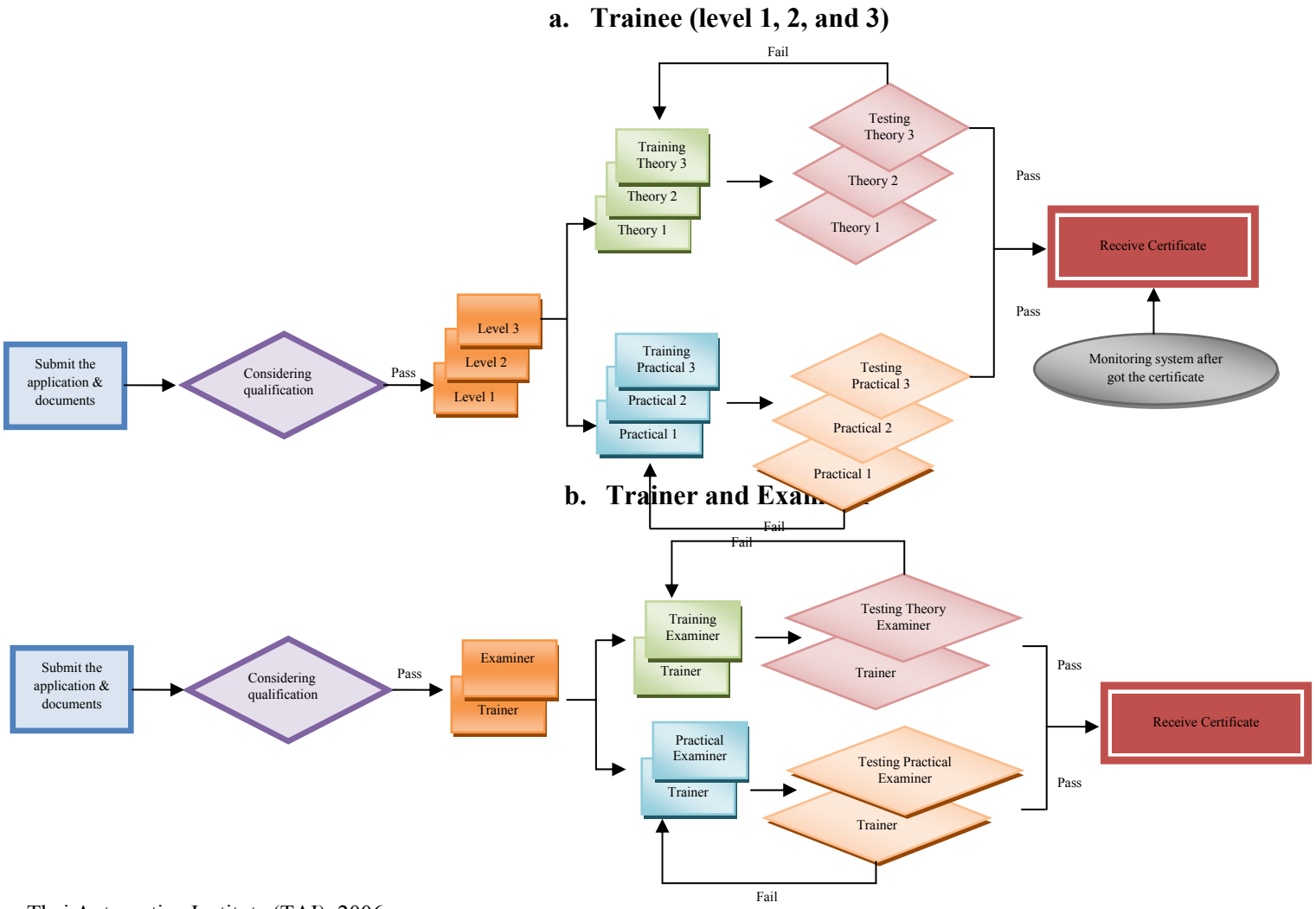
- Level 2: Intermediate skilled operators, the training participants can understand the knowledge about theoretical, measurement, criteria, process, and the order for doing the job. Furthermore, they can consider the choices, examines, making the decision for solving the problems, and improve the task by themselves.
- Level 3: Advanced skilled operators, the training participants should have the ability for analyzing the importance of job, linking with others task, making job's plan, and evaluate the effectiveness of task. Moreover, they can improve leadership skill and provide the solution and suggestion for subordinate to solve the problems on the job.
- Trainer, the training participants have the ability to transfer knowledge and skills from training, and coaching for the other employees on the job. Furthermore, they can be the instructor for training in the organization.
- Examiner, the training participants have the ability to evaluate by grade for the trainees who attend on practical testing of training. (Thai Automotive Institute, 2006)

**Figure 4-4:** The level of the skill certification system




Source: Thai Automotive Institute (TAI), 2006

**Figure 4-5:** Training and testing process of the skill certification system




Source: Thai Automotive Institute (TAI), 2006

Among total 363 participants for 16 subjects of skill certification system between 2006-2011, Mechanical maintenance (51 persons) and Metal Press work/Stamping (42) are much more passers. Besides five subjects are taken by more than 20 persons; that is Electrical Maintenance (37), Hydraulic System Adjustment (34), Pneumatic Circuits and Apparatus Devices Assembling (27), Ferrous Casting (25), and Plastic Injection (21). For the number of participants who got the certificate in all subjects, please refer to Table 4-2.

**Table 4-2:** Participants in Thai automotive skill certification system by subjects

| Subjects | Total (persons) | Per cent |
|---|---|---|
| Die and Mold Finishing | 12 | 3.31 |
| Electrical Maintenance | 37 | 10.19 |
| Electronics Device Assembly | 12 | 3.31 |
| Ferrous Casting | 25 | 6.89 |
| Hydraulic System Adjustment | 34 | 9.37 |
| Machining (Lathe) | 10 | 2.75 |
| Lathe with Numerical Control | 13 | 3.58 |
| Mechanical Assembly Finishing | 12 | 3.31 |
| Mechanical Drawing By CAD | 12 | 3.31 |
| Mechanical Drawing By Hand | 12 | 3.31 |
| Mechanical maintenance | 51 | 14.05 |
| Machining (Milling) | 11 | 3.03 |
| Milling with Numerical Control | 15 | 4.13 |
| Plastic Injection | 21 | 5.79 |
| Pneumatic Circuits and Apparatus Devices Assembling | 27 | 7.44 |
| Sequence Control (PLC) | 17 | 4.68 |
| Metal Press work/Stamping | 42 | 11.57 |
| Total | 363 | 100.00 |

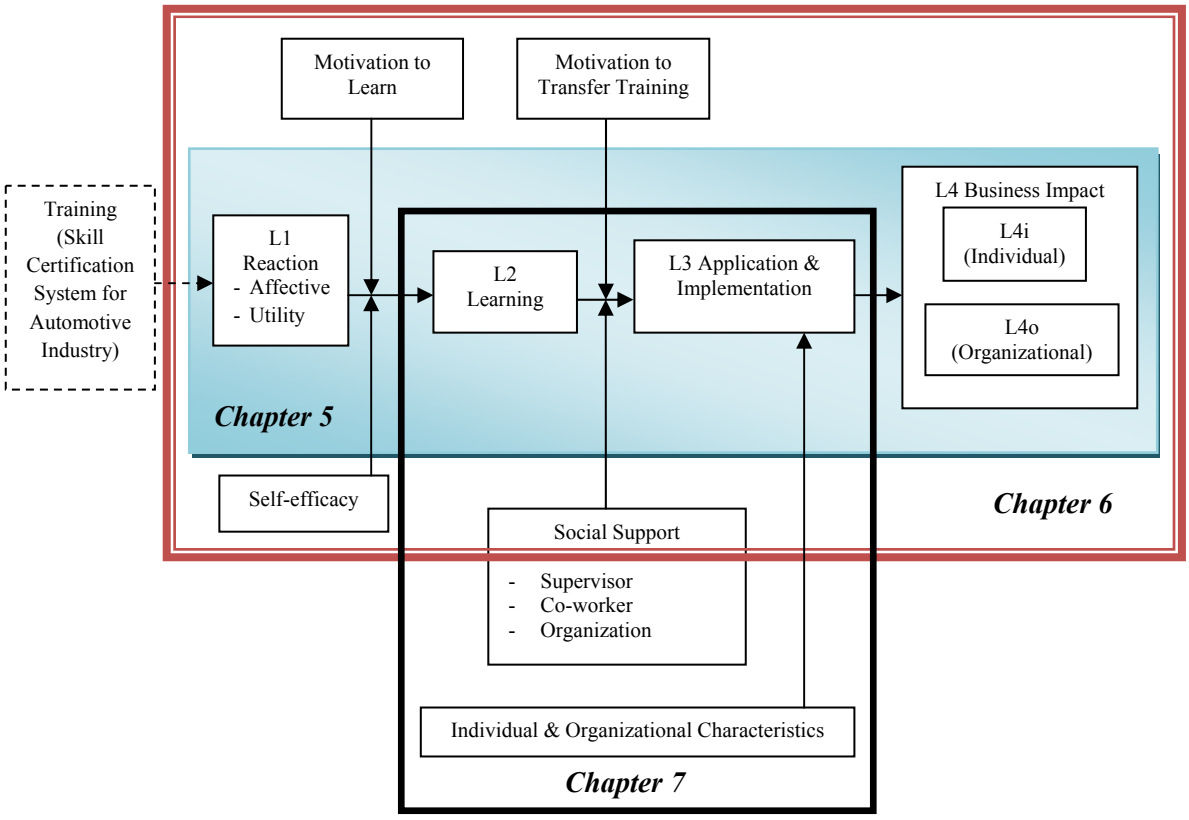
Source: Thai Automotive Institute (TAI), 2012

## 4.3 Research Methodology

### 4.3.1 Research Framework

The research framework is mainly based on four levels of Kirkpatrick's model utilized as the basic components of the model for training evaluation in HRD study. In addition, this study also integrated the individual and work environment characteristics on four-levels of Kirkpatrick's model. We also investigate moderator variables on the relationships between reaction (L1) and learning (L2), and behavior (L3), such as learning motivation, self-efficacy, motivation to transfer, and social support. The recognition of these factors challenges HRD professionals to use this knowledge to enhance training effectiveness, because Kirkpatrick's model does not consider individual or contextual influences in the evaluation of training and those factors are not well recognized in practices. The research frame work is shown in Figure 4-6.

**Figure 4-6:** Overall research framework



### 4.3.2 Data and Sample

The case of the present study, a skill certification system for the automotive industry in Thailand, was one of the sub-programs under the Automotive Human Resource Development Program (AHRDP) and has been expected to be very significant because of its potential impact on the whole industry. AHRDP was implemented from 2006 to 2011 as the part of the Japanese Official Development Assistance (ODA) program in cooperation with the Thai government and private sectors in both countries. Specifically for the skill certification system, Japanese experts from the automotive assembler Nissan initially supported knowledge transfer to local prospective examiners and trainers. They, in turn, taught the acquired skills and knowledge to employees in local firms through training and examination. Until 2011, 363 persons were certified in 16 subjects including theoretical and practical sessions. The questionnaire survey was implemented during November and December of 2012 through face-to-face interviews with 228 persons by 10 research assistants. However, considerable part of participants in a skill certification system attended multiple levels and training subjects. Therefore, they were asked about the last certificate that they obtained among others. All survey participants passed the skill certification exam after training in the sub-program and 228, all the persons who were interviewed, provided valid responses.

**Table 4-3:** The descriptive of sample's characteristics

| Characteristics of sample (N = 228) | Descriptive |
|---|---|
| The level of the skill certification system | |
| - Examiner | 148 persons |
| - Trainer | 225 persons |
| - Trainee | 61 persons |

| Characteristics of sample (N = 228) | Descriptive |
|---|---|
| Subjects of a skill certification system | |
| - Electrical maintenance | 11.20% |
| - Mechanical maintenance | 9.50% |
| - Pneumatic circuits and apparatus device assembling | 8.80% |
| - Metal press work/stamping | 8.40% |
| - Hydraulic system adjustment | 8.20% |
| - Die and mold finishing | 6.50% |
| - Electronic device assembly | 6.50% |
| - Plastic injection | 6.50% |
| - Ferrous casting | 6.00% |
| - Sequence control | 6.00% |
| - Milling with numerical control | 5.00% |
| - Machining (lathe, milling) | 4.70% |
| - Lathe with numerical control | 4.50% |
| - Mechanical assembly finishing | 3.00% |
| - Mechanical drawing by hand | 3.00% |
| - Mechanical drawing by CAD | 2.20% |
| Gender | |
| - Male | 98.70% |
| - Female | 1.30% |
| Age | |
| - 31 - 40 years old | 48.00% |

| Characteristics of sample (N = 228) | Descriptive |
|---|---|
| - 21 - 30 years old | 40.10% |
| - Above 40 years old | 11.90% |
| Affiliation | |
| - Automotive assembler or automotive parts manufacturer | 55.50% |
| - Universities and training intuitions such as vocational colleges | 44.50% |

Of the 228 study participants (Table 4-3), 148 people participated in examiner training and 225 in trainer training, while the remaining 61 people attended ordinary training. A participant could attend multiple levels and study various training subjects. The subjects attended by trainees included electrical maintenance (11.2%), mechanical maintenance (9.5%), pneumatic circuits and apparatus device assembling (8.8%), metal press work/stamping (8.4%), hydraulic system adjustment (8.2%), three courses on die and mold finishing, electronic device assembly, and plastic injection (6.5%), both ferrous casting and sequence control (6.0%), milling with numerical control (5.0%), machining (lathe, milling) (4.7%), lathe with numerical control (4.5%), both mechanical assembly finishing and mechanical drawing by hand (3.0%), and mechanical drawing by CAD (2.2%).

Among the sample (Table 4-3), 98.7% of the participants were male. Regarding their age, 48.0% of the samples were between 31 and 40 years old and 40.1% were between 21 and 30 years old, whereas 11.9% were above 40 years old. 38.9% graduated from university, and 33.3% graduated from vocational schools. 55.5% of the respondents worked for an automotive assembler or automotive parts manufacturer, while 44.5% of the respondents were from universities and training intuitions such as vocational colleges. Although they did not worked

in the factory they could applied the knowledge and skills from training of skill certification system through teaching their students and trainees.

### 4.3.3 Procedure

A questionnaire survey was conducted by interview for training and examination participants. The questionnaire was developed for the more comprehensive study on training effectiveness. It contained questions on individual characteristics, training experiences, training effectiveness (reactions, knowledge retained, transfer, results), self-efficacy, learning motivation, motivation to transfer training, and social and organizational support (See Appendix 1 in Appendices). The skill certification system for the automotive industry consists of three levels: Examiner, Trainer, and Operator (that includes three levels: primary skilled, intermediate skilled, and advanced skilled). We obtained the data from the participants who passed the skill certification exam after training was completed. Although some participants may attend multiple levels and subjects, this survey focuses only on the latest ones.

### 4.3.4 Measures

The measures have been used in this study including reaction, learning, behavior, and results for analyzing Kirkpatrick's four-level hierarchy of training evaluation. In addition, this study also used specifically both types of reaction including affective and utility reactions for predicting training outcomes. Furthermore, the other measures are learning motivation, self-efficacy, motivation to transfer, social support (supervisor and co-worker support), and organizational support have been used to investigated as the moderating effect on four levels of Kirkpatrick's model.

To ensure the measures were appropriate this study also examined a confirmatory factor analysis (CFA) via AMOS version 21 by using maximum likelihood (ML) estimation. CFA is a special form of factor analysis, most commonly used in social science, health,

psychological, educational, and sociological research. It is extended analysis of Exploratory Factor Analysis (EFA) and used to test whether measures of construct consistent with a researcher's understanding of the nature of that construct (or factor). The objective of confirmatory factor analysis is to test whether the data fit a hypothesized measurement model. Model fit measures could be obtained to assess how well the proposed model captured the covariance between all the items or measures in the model. All redundant items exist in a latent construct will be either removed or constrained (Nazim and Ahmad, 2013). Model fitness estimation, reliability and validity are as follows:

**Table 4-4:** Fitness estimation

| Name of Category | Name of Index | Level of Acceptance | Literature |
|---|---|---|---|
| Factor loading | Standardized Regression Weight | Weight > 0.5 | Heir et al. (1998) |
| Absolute fit | $\chi^2$ | P > 0.05 | Wheaton et al. (1977) |
| | RMSEA | RMSEA < 0.08 | Browne and Cudect (1993) |
| | SRMR | SRMR < 0.06 | Hu and Bentler (1995) |
| | GFI | GFI > 0.9 | Jareskog and Sornom (1984) |
| Incremental fit | AGFI | AGFI > 0.9 | Tanaka and Huba (1985) |
| | CFI | CFI > 0.9 | Bentle (1990) |
| | TLI | TLI > 0.9 | Bentler and Bonett (1980) |
| | NFI | NFI > 0.9 | Bollen (1989) |
| Parsimonious fit | $\chi^2$/df | $\chi^2$/df < 5.0 | Marsh and Hocevar (1985) |

*Note.* GFI = goodness of fit index, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation, AGFI = adjusted goodness of fit index, CFI = comparative fit index, TLI = Tucker-Lewis index, NFI = normed fit index.

**Table 4-5:** Reliability and validity

| Name of Category | Name of Index | Level of Acceptance | Literature |
|---|---|---|---|
| Convergent validity | Average variance extracted | AVE ≥ 0.5 | Heir et al. (1998), Zainudin (2012) |
| Internal reliability | Crobach alpha | $\alpha \geq 0.6$ | Heir et al. (1998), Zainudin (2012) |
| Construct reliability | CR | CR ≥ 0.6 | Heir et al. (1998), Zainudin (2012) |

The measurement scales of latent variables were examined using the principal components analysis (PCA). PCA is the technique for extracting factors, and thus, is most commonly used in exploratory factor analysis (EFA) in SPSS 19. The aim of the data extraction is to reduce a large number of items into factors. Some items were eventually eliminated using this process (See Appendix 2 in Appendices). Then, all remaining items from all measures were entered into a confirmatory factor analysis (CFA) in AMOS version 21 by using maximum likelihood (ML) estimation.

**Table 4-6:** The latent constructs fitness indexes

| Measures | Parsimonious | Incremental Fit | | | | Absolute Fit | | |
|---|---|---|---|---|---|---|---|---|
| | Fit $\chi^2$/df | TLI | CFI | AGFI | NFI | GFI | SRMR | RMSEA |
| Reaction | 1.095 | 0.981 | 0.994 | 0.898 | 0.867 | 0.935 | 0.047 | 0.020 |
| - Affective | 1.070 | 0.990 | 0.993 | 0.921 | 0.911 | 0.953 | 0.046 | 0.018 |
| - Utility | 1.718 | .994 | 1.000 | 0.991 | 0.994 | 0.997 | 0.016 | 0.000 |
| Learning | 1.397 | 0.972 | 0.975 | 0.926 | 0.890 | 0.951 | 0.052 | 0.036 |
| Behavior | 2.049 | 0.932 | 0.829 | 0.917 | 0.821 | 0.965 | 0.069 | 0.068 |
| Results | 1.304 | 0.813 | 0.966 | 0.909 | 0.949 | 0.950 | 0.064 | 0.046 |
| Learning Motivation | 1.370 | 0.833 | 0.995 | 0.970 | 0.982 | 0.994 | 0.038 | 0.040 |
| Self-efficacy | 1.010 | 0.897 | 1.000 | 0.980 | 0.990 | 1.000 | 0.024 | 0.007 |
| Motivation to Transfer | 4.173 | 0.848 | 0.958 | 0.915 | 0.875 | 0.983 | 0.060 | 0.118 |
| Social Support | 1.308 | 0.913 | 0.947 | 0.933 | 0.822 | 0.958 | 0.063 | 0.037 |
| - Supervisor Support | 1.425 | 0.943 | 0.972 | 0.943 | 0.916 | 0.978 | 0.048 | 0.044 |
| - Co-worker Support | 2.176 | 0.927 | 0.988 | 0.950 | 0.979 | 0.995 | 0.027 | 0.074 |
| - Organizational Support | 1.532 | 0.974 | 0.996 | 0.965 | 0.988 | 0.996 | 0.025 | 0.050 |

The results from the CFA reported that all of the criteria were satisfactory. The scale internal structure fit measures abstract is shown in Table 4-6 and Table 4-7. The results from the CFA showed that all factor loadings and path coefficients were statistically insignificant, with all factor loadings above 0.50 (Hair, Anderson, Tatham, and Black, 1998). The CFA

results of all measurement were appropriate. As a test of reliability, Cronbach's α was adopted to represent internal consistency. Cronbach's α for each scale of questionnaire is acceptable with all values but utility reaction greater than threshold of 0.60 (the value for utility reaction was 0.594 that was slightly below 0.60). According to Hair et al. (1998) and Zainudin (2012) a coefficient of α = 0.70 is widely acceptable. They also suggest that coefficients as low as α = 0.60 are acceptable for exploratory research (see Table 4-7).

**Table 4-7:** CFA summary: conbach alpha, construct reliability and convergent validity

| Measures | Dimensions | Items | Factor Loading | Delta | Eigenvalues | Variance Extracted | Cronbach Alpha | CR | AVE |
|---|---|---|---|---|---|---|---|---|---|
| Affective Reactions | Satisfaction with instructor's teaching | A2 | 0.840 | 0.294 | 1.297 | 64.84% | 0.639 | 0.934 | 0.679 |
| | | A3 | 0.598 | 0.642 | | | | | |
| | Satisfaction with instructors manage training | A4 | 0.513 | 0.737 | 1.694 | 56.47% | | | |
| | | A5 | 0.710 | 0.496 | | | | | |
| | | A6 | 0.530 | 0.719 | | | | | |
| | Satisfaction with information & training management | A7 | 0.809 | 0.346 | 1.470 | 73.50% | | | |
| | | A8 | 0.548 | 0.700 | | | | | |
| | Satisfaction with administration process | A10 | 0.550 | 0.698 | 1.542 | 77.11% | | | |
| | | A11 | 0.978 | 0.044 | | | | | |
| | Satisfaction with the testing process | A12 | 0.752 | 0.434 | 1.982 | 66.06% | | | |
| | | A13 | 0.807 | 0.349 | | | | | |
| | | A14 | 0.562 | 0.684 | | | | | |
| | Satisfaction with materials | A22 | 0.543 | 0.705 | 1.466 | 73.29% | | | |
| | | A23 | 0.851 | 0.276 | | | | | |
| | Satisfaction with course structure | A26 | 0.667 | 0.555 | 1.699 | 84.93% | | | |
| | | A27 | 0.599 | 0.641 | | | | | |
| Utility Reactions | Matching & clear between course objective and your job | U15 | 0.672 | 0.548 | 1.700 | 85.00% | 0.594- | 0.812 | 0.646 |
| | | U16 | 0.667 | 0.555 | | | | | |
| | The important & the relevance of course content to your job | U17 | 0.757 | 0.427 | 1.402 | 70.11% | | | |
| | | U18 | 0.533 | 0.716 | | | | | |
| | Quality & the extent of course prepared to perform new job tasks | U20 | 0.584 | 0.659 | 1.386 | 69.31% | | | |
| | | U21 | 0.661 | 0.563 | | | | | |
| Learning | K & A increase for doing current job | L1 | 0.656 | 0.570 | 1.599 | 79.95% | 0.665 | 0.893 | 0.583 |
| | | L2 | 0.914 | 0.165 | | | | | |
| | Applying K to find out & solve problems | L3 | 0.554 | 0.693 | 1.292 | 64.60% | | | |
| | | L4 | 0.528 | 0.721 | | | | | |
| | S & A increase for doing current job | L8 | 0.834 | 0.304 | 1.696 | 84.80% | | | |
| | | L9 | 0.828 | 0.314 | | | | | |
| | Applying S (leadership & coaching skills improve) | L12 | 0.965 | 0.069 | 1.684 | 84.20% | | | |
| | | L13 | 0.709 | 0.497 | | | | | |
| Behavior | Improving work | B1 | 0.853 | 0.272 | 1.577 | 78.85% | 0.647 | 0.808 | 0.639 |
| | | B2 | 0.556 | 0.691 | | | | | |
| | Fewer mistakes & quick decision | B5 | 0.557 | 0.690 | 1.389 | 69.45% | | | |
| | | B6 | 0.698 | 0.513 | | | | | |

| Measures | Dimensions | Items | Factor Loading | Delta | Eigenvalues | Variance Extracted | Cronbach Alpha | CR | AVE |
|---|---|---|---|---|---|---|---|---|---|
| | Retention | B10 | 0.607 | 0.632 | 1.341 | 67.05% | | | |
| | | B11 | 0.561 | 0.685 | | | | | |
| Results | Worthwhile investment for my career development & increase opportunity to find new job | R1 | 0.575 | 0.669 | 1.556 | 77.80% | 0.639 | 0.908 | 0.734 |
| | | R2 | 0.966 | 0.067 | | | | | |
| | Improved job involvement & more commitment | R8 | 0.557 | 0.690 | 1.484 | 74.22% | | | |
| | | R9 | 0.870 | 0.243 | | | | | |
| | Worthwhile investment for my company | R11 | 0.888 | 0.211 | 1.474 | 73.70% | | | |
| | | R12 | 0.511 | 0.739 | | | | | |
| | Decreasing cycle time & increasing sales | R17 | 0.779 | 0.393 | 1.564 | 78.22% | | | |
| | | R18 | 0.725 | 0.474 | | | | | |
| Learning Motivation | Motivated to learn | LM1 | 0.518 | 0.732 | 1.892 | 63.06% | 0.665 | 0.674 | 0.630 |
| | | LM2 | 0.857 | 0.266 | | | | | |
| | | LM3 | 0.516 | 0.734 | | | | | |
| Self-efficacy | Confident in ability to learn & use newly KS on the job | SE1 | 0.685 | 0.531 | 1.788 | 59.60% | 0.626 | 0.678 | 0.641 |
| | | SE2 | 0.679 | 0.539 | | | | | |
| | | SE3 | 0.558 | 0.689 | | | | | |
| Motivation to Transfer | Motivated to apply new KS to the job | MT1 | 0.705 | 0.503 | 1.800 | 59.99% | 0.801 | 0.831 | 0.785 |
| | | MT2 | 0.924 | 0.146 | | | | | |
| | | MT3 | 0.725 | 0.474 | | | | | |
| Supervisor Support | Encourage employees to improve their skills & set the criteria for applying new KS to the job | SS4 | 0.523 | 0.726 | 1.208 | 60.38% | 0.617 | 0.783 | 0.556 |
| | | SS5 | 0.537 | 0.712 | | | | | |
| | Providing assistance & discuss about how to apply KS to the job | SS6 | 0.503 | 0.747 | 1.480 | 74.02% | | | |
| | | SS7 | 0.536 | 0.713 | | | | | |
| | Informs group performance in accomplishing tasks & sharing work-related information/knowledge | SS9 | 0.606 | 0.633 | 1.464 | 73.22% | | | |
| | | SS10 | 0.545 | 0.703 | | | | | |
| | Supporting information/knowledge & open to share work-related information/knowledge | SS11 | 0.684 | 0.532 | 1.318 | 65.88% | | | |
| | | SS12 | 0.515 | 0.735 | | | | | |
| Co-worker Support | Supporting the trainee for applying new KS on the job | SP15 | 0.597 | 0.644 | 1.365 | 68.27% | 0.631 | 0.791 | 0.695 |
| | | SP16 | 0.821 | 0.326 | | | | | |
| | Open and share work-related information/knowledge | SP17 | 0.641 | 0.589 | 1.383 | 69.14% | | | |
| | | SP18 | 0.721 | 0.480 | | | | | |

| Measures | Dimensions | Items | Factor Loading | Delta | Eigenvalues | Variance Extracted | Cronbach Alpha | CR | AVE |
|---|---|---|---|---|---|---|---|---|---|
| Organizational Support | Providing training opportunities, information, & strategy plan for developing employees | SO20 | 0.524 | 0.725 | 1.552 | 77.58% | 0.607 | 0.663 | 0.574 |
| | | SO21 | 0.639 | 0.592 | | | | | |
| | Providing infrastructure for sharing & teaching KSA from training to other employees | SO23 | 0.603 | 0.636 | 1.319 | 65.94% | | | |
| | | SO24 | 0.528 | 0.721 | | | | | |

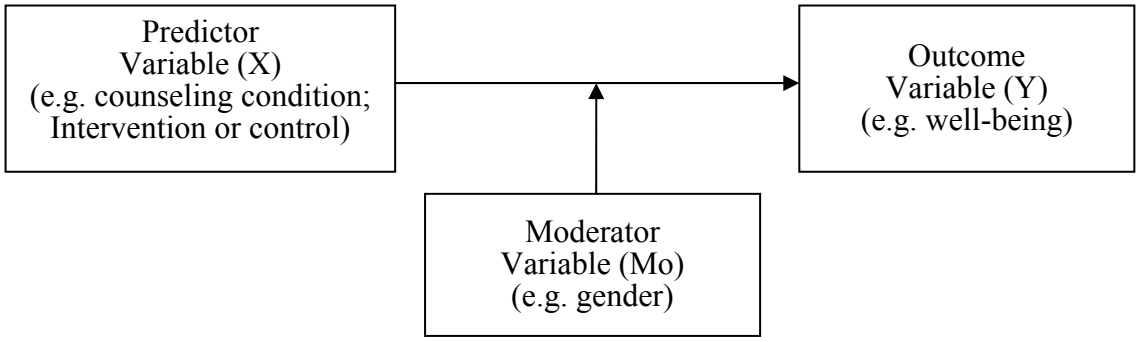
*Note:* The delta is also referred to as the standardized error variance, CR is construct reliability, AVE is average variance extracted.

### 4.3.5 Method of Analysis

The main method of analysis adopted in this dissertation included Structural Equation Model (SEM) for analyzing the data in Chapter 5, which enables to identify the relationship among the variables all at once. As SEM has not been utilized in related studies, the analysis will be a new challenge in methodology. Moreover, Chapter 6 and 7 analyzed data by path analysis and the hierarchical regression analysis for assessing the influence of the moderating variables on independent-dependent relationships.

Given one of main goals of the dissertation, the methodology of moderation is important for assessing the influence of the moderating variables. This method is commonly used in social science, health, psychological, educational, and sociological research. A moderator is a third variable that modifies a causal effect that postulates "when" or "for whom" an independent variable most strongly (or weakly) causes a dependent variable (Baron and Kenny 1986; Frazier et al. 2004). The moderation effect is more commonly known as the statistical term "interaction" effect where the strength or direction of an independent variable effect on the dependent variable depends on the level or the value of the other independent variable (see Figure 4-7).

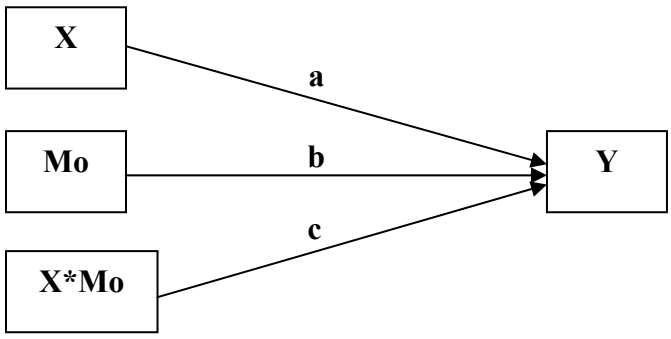
**Figure 4-7:** Diagram of moderator effect




Source: Frazier, Tix, and Barron, (2004)

**Figure 4-8:** Statistical path diagram for moderation effect

Moderation model




In this diagram (Figure 4-8), the dependent variable Y is predicted by three variables: X, Mo, and X*Mo. Moderation is indicated by the significant effect of the product term X*Mo while X and Mo are controlled. The effect c of X*Mo represents the unique synergistic effect of the two variables working together, over and above their separate effects. Thus, two variables X and Mo are said to interact in accounting for the variance in Y; that is, over and above their separate effects, they have joint effect.

The moderation model can be written as a multiple regression such that:

$$Y = i + aX + bMo + c(X*Mo)$$

Where

i is the regression intercept,

a is the partial regression coefficient for the focal independent variable X,

b is the partial regression coefficient for the moderator,

c is the partial regression coefficient for the product term X*Mo, which is the moderation effect.

Moderator variables can be at the nominal, interval, continuous, or ratio level. Depending on the type (level) of the moderator variable and independent variable, different

statistical analyses are used to measure and test the differential effects. The statistical tests are multiple regression analyses (hierarchical multiple regression), structural equation modeling (SEM), and analysis of variance (ANOVA).When the moderator is a categorical variable, the appropriate statistical technique is the familiar two-way factorial ANOVA, and the moderation effect is indicated by a significant interaction effect. When the moderator is measured on a quantitative scale, a regression analysis is often a more appropriate choice because it has superior statistical power than ANOVA. The main statistical method for testing moderating effect in this dissertation is SEM and multiple regression analyses (hierarchical multiple regression). Therefore, this chapter presents a comprehensive review of the SEM and multiple regression analyses (hierarchical multiple regression) as below.

***1) Multiple Regression Analyses***

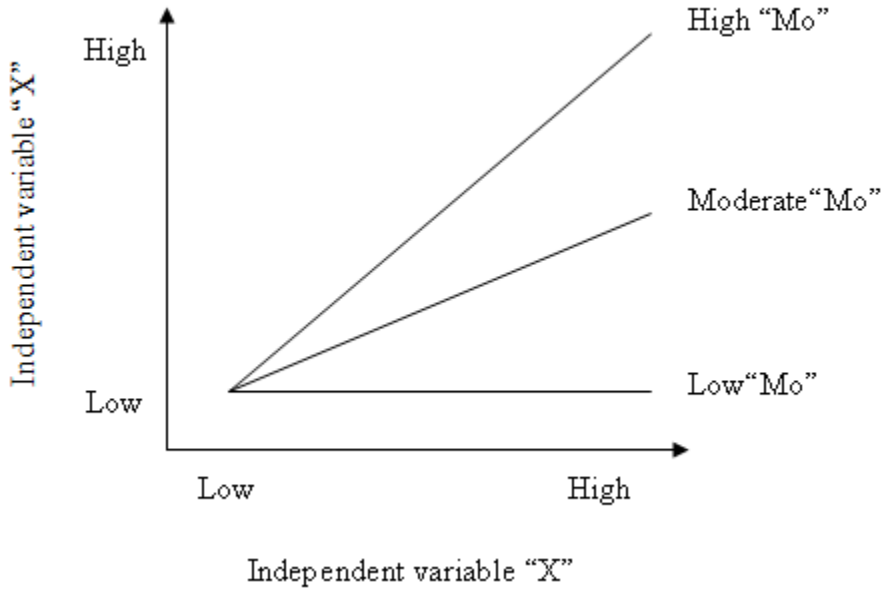
When predictor and moderator variables are interval or continuous, multiple regression analyses are used for testing moderating effects. Most commonly, researchers assume that a continuous moderator variable alters the relationship between the independent and dependent variables in a linear function (Baron and Kenny, 1986). Using the example shown in Figure 4-7 in which both moderator and dependent variable are continuous, the following statistical analyses would be appropriate. First, the predictor variables "X" and "Mo" are entered into the regression equation to test their main effects. This is followed by the interaction term which is generated by multiplying the predictor by the moderator (X*Mo). Depending on the researcher's conceptual framework, the main effects can be entered into the equation in hierarchical, stepwise, or simultaneous methods (Cohen and Cohen, 1983). Although the main effects may be entered in any order, they must be entered first and before the interaction term (X*Mo) is introduced at a separate step. If the change in $R^2$ ($\Delta R^2$) for the interaction term is

statistically significant, it is a moderating effect, and the moderator hypothesis is supported (Aldwin, 1994; Baron and Kenny, 1986; Holmbeck, 1997).

Interpretations of statistically significant interactions require several steps. First, calculations have to be made for low, medium, and high level for the predictor variables "X" and "Mo" which are usually defined as the mean -1 standard deviation (*SD*) for low levels, the mean for median levels, and the mean +1 *SD* for high levels. Simple regression equations can solved for each level of the moderator. The obtained regression lines for high, medium, and low values of the moderator variable are then plotted to determine whether there is a buffering, enhancing, or situation-specific effect (Aldwin, 1994; Cohen and Cohen, 1983; Holmbeck, 1997). Figure 4-9 shows that when the level of "Mo" is high, the stronger the relationship between the variables "X" and "Y" is. This represents an enhancing effect of moderator variable. Figure 4-9 also shows that when "Mo" are low (bottom line), there is no relationship between the variables "X" and "Y".

Researchers much also be aware of the problem of multicollinearity that may result when the variables being multiplied to generate the interaction term (X*Mo) are highly correlated with each other: multicollinearity causes "bouncing betas" in which the direction of the beta terms can shift from previously positive to negative relationships or vice versa (Cohen, 1978). However, multicollinearity may be reduced by centering continuous predictor and moderator variables. This is accomplished by subtracting the sample mean from the respective variable, thereby obtaining a centered deviation score with a mean of zero. Centering the bête terms reduces the magnitude of the correlations between the independent variables, thus reducing multicollinerity (Aldwin, 1994).

**Figure 4-9:** The example of enhancing effect of "Mo" on the dependent variable "Y"




***2) Structural Equation Modeling (SEM)***

SEM is useful to test moderating effects based on maximum likelihood analysis. SEM should be used if any of the following conditions exist: (1) the model is no recursive, (2) the model has correlated residuals, or (3) the model has multiple indicator variables for unobserved (or latent) variables (Pedhazur, 1982). No recursive models, that is, models with reciprocal relationships, cannot be analyzed with regression analysis. However, with SEM it is possible to separate out the confounding aspects of reciprocal effects (Biddle and Marlin, 1987; Peyrot, 1996). SEM also makes allowances for errors in measurements in the statistical model. Measurement errors are important because they can attenuate the relationship between two variables (Baron and Kenny, 1986; Peyrot, 1996). Furthermore, SEM is capable of generating solutions for models in which unobserved variables (constructs or latent variables) are measured by multiple indicators (Biddle and Marlin, 1987; Mason-Hawkes and Holm, 1989; Pedhazur, 1982; Peyrot, 1996).

**Table 4-8:** Summarizes the major points of moderator

| | Moderator variables (see Figure 4-7) |
|---|---|
| Why used | To establish when/under what conditions a predictor variable influences a dependent variable |
| Position in model | Always at the level of predictor variables: "Mo" same level as "X" |
| Type of variable | Interval, continuous, ratio, or categorical |
| Statistical significance | If interaction between independent variable and moderator variable is significant ("X" multiplied by "Mo") |

Source: Kim, Kaye, and Wright, (2001)

Table 4-8 summarizes the major points of this discussion. A moderator variable specifies when or under what conditions a predictor variable influence the dependent. Moderators are most often introduced when the relationship between predictor and dependent variables is unexpectedly weak. Moderators are always at the same level as predictor variables.

# Chapter 5

# Testing Kirkpatrick's Four-Level Hierarchy of Training Evaluation

This chapter investigated progressive causal relationship of Kirkpatrick's model from reaction, learning, behavior, to results. In addition, this chapter alsoexamined thehierarchy of four levels by focusing specifically different type of reaction's criteria including affective and utility reaction inpredicting training outcomes. This chapter is divided into eight sections. Section 5.1 is introduction and presents the objectives of this chapter. Section 5.2 presents the conceptual framework and the next section (section 5.3) provides the review of previous studies and develops the hypotheses in this study. Section 5.4 and 5.5 provide the measures and analysis of measurement model. Results and discussion will be provided in section 5.6 and 5.7. The last section, 5.8 is conclusion.

## 5.1 Introduction

Training is the most important strategy as well as commonly used human resource development activity by organizations to help employees improve knowledge and skills to meet environmental challenges. Organizations have come to spend more time and money on training; therefore, it is important that they evaluate the effectiveness of their training efforts more than ever (Cascio, 1989).

Among training evaluation models, Kirkpatrick's four-level model is the most extensively accepted and used, as it is simple, clear, and easy to implement, as training evaluators expect. The model shows four levels of training outcomes: reaction, learning,

behavior (transfer), and results. Organizations often evaluate training effectiveness using one or more of Kirkpatrick's criteria (Kirkpatrick, 1994). However, there are three limitations of Kirkpatrick's model that have implications for the ability of training evaluators to deliver benefits and, further, to satisfy the interests of organizations. These include the incompleteness of the model, the assumption of causality, and the assumption of the increasing importance of information as the levels of outcomes rise (Bates, 2004).

This study highlights one important discussion point concerning Kirkpatrick's model, that is, its emphasis on the progressive causal relationship of reaction, learning, and job behavior to results. For instance, trainees' satisfaction is important in making learning effective. Without learning, behavioral change will not occur (Kirkpatrick, 1994). Several studies of training evaluation have failed to confirm the hierarchical relationship of reaction, learning, and behavior to results because of the difficulty of evaluating training. Two meta-analyses of training evaluation studies, Alliger and Janak's (1989) and Alliger et al.'s (1997), investigated the relationship among training criteria by using Kirkpatrick's model. They found little evidence either of substantial correlations between measures at different outcome levels or evidence of the linear causality suggested by Kirkpatrick (1994). Thus, as the model is still widely but only partially used in academic circles and by businesses, training evaluation academics tend to emphasize the need to examine all four of Kirkpatrick's evaluation levels.

The measurement of the reaction which generally takes place at the end of a course is the most commonly evaluated by organizations (Swanson and Sleezer, 1987; Arthur, Bennett, Edens and Bell, 2003). However, the previous studies did not provide a clear picture of the relationship between reaction and learning. That is because past research may have been limited by the criteria of reactions as a single dimensional construct. This is a considerable gap in trainee reaction for assessing the effectiveness of training. However, whether or not

traineesare satisfied with the training they received does not provide an in-depth understanding of the effectiveness or other results of the training (Kirkpatrick, 1967). Alliger et al. (1997) suggested that many trainee reaction items can be collapsed into a single affective dimension. Thus, when designing training programs and evaluating the results, various critical aspects of trainee reactions should be considered rather than focusing only on affective reactions such as whether the trainee enjoyed the training. Specifically, their reaction forms should include utility judgments (Alliger et al, 1997). This leads to an increased understanding of the role specific reactions play in training effectiveness.

Discussion about the insufficiency of reaction measures and research in this area has tended to downplay the importance of level 1 evaluation (Giangreco et al., 2009). In fact, for several decades, the distinction between learning and job behavior has drawn increased attention to the importance of the learning transfer process in making training truly effective (Bates and Coyne, 2005). However, evaluation of reactions should not be ignored. In this respect, the following four reasons for reaction evaluation should be emphasized. First, positive training experiences may well have a beneficial impact on employee attitudes and behaviors (Alliger and Janak, 1989; Arthur et al., 2003; Clement, 1982). Second, reaction evaluations can help organizations identify particular problems or weaknesses in their current training and improve their future training (Brown and Gerhardt, 2002; Mann and Robertson, 1996; Tannenbaum and Woods, 1992; Brinkerhoff, 1986; Ford and Wroten, 1984). Third, it shows trainees that the trainers are there to help them do their job better and that they need feedback to determine how effective they are (Kirkpatrick, 1994). Finally, reaction is more practically acceptable for training evaluation as a potential predictor of more costly criteria for training effectiveness—measures of learning, measures of on-the-job behavior, and measures of organization results. Thus, it is still important to examinethe level of reaction to training.

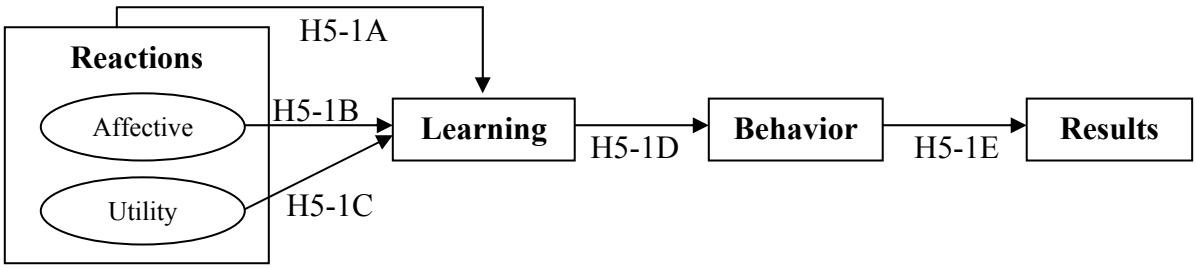
Mostly in Thailand, training evaluation is based on the participants' satisfaction survey of the program, trainers' subjective evaluation, and whether the trainees can understand and absorb the knowledge and skills from the training. Although these indicate Kirkpatrick's level one (reaction) and level two (learning) approaches, few studies have used all four levels of Kirkpatrick's model to evaluate Thai industries, including the automotive industry, the subject of the present study. Because of the difficulty of evaluating training by higher levels, much training in Thailand either ignores behavior (level three) and results (level four) or approaches it through reaction and learning only.

Based on the arguments above, the main purpose of this study is to investigate Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes. To achieve the purpose of this research, the author poses the following research questions: What is the relationship of reaction, learning, and behavior to results? In particular, how do trainees' affective and utility reactions influence learning?

## 5.2 Conceptual Framework

The conceptual framework for this study is shown in Figure 5-1. A focus of this study is testing Kirkpatrick's four-level hierarchy of training evaluation and investigating two facets of reactions, that is, affective and utility reactions, to predict training effectiveness. Specific hypotheses for each of the relationships are illustrated in Figure 5-1.

**Figure 5-1:** Conceptual framework




## 5.3 Literature Review and Development of Hypotheses

Many of the research on training evaluation have depended on Kirkpatrick's (1967) four-level typology to explain the effectiveness of training. Level 1, reaction, is trainees' feelings about and like of a training program. Although a positive reaction may not ensure learning, a negative reaction probably reduces the possibility that learning occurs. Note that a reaction measure is conceived in attitudinal rather than behavioral terms. Level 2, learning, is defined as the "principles, facts, and techniques understood and absorbed by the trainees" (Alliger and Janak, 1989). No change in behavior can be expected unless one or more of these learning objectives have been accomplished (Kirkpatrick, 1994). Learning is most often assessed by giving the trainees tests that tap declarative knowledge (Kriger et al., 1993). This level of evaluation allows trainees to demonstrate their understanding of specific knowledge and/or skills within the learning program. Level 3, behavior change or transfer, refers to the knowledge and skills transferred to the job by trainees. This level attempts to determine whether trainees (who can apply the acquired specific knowledge and/or skills) use their new knowledge and/or skills when returning to the work environment. Level 4, results, refers to the final results that occurred because the trainees attended the program (Kirkpatrick, 1994). These could include the attainment of organizational objectives such as a reduction in absenteeism and personnel turnover, productivity gains, and cost reduction.

Kirkpatrick's model assumes that the levels of criteria represent a causal chain such that positive reactions lead to greater learning, which produces greater transfer and subsequently more positive organizational results (Bates, 2004). Although Kirkpatrick is not clear about the causal linkages between training outcomes, his model can imply that a simple causal relationship exists between the levels of evaluation (Holton, 1996). In one of Kirkpatrick's more recent publications he argued that "if training is going to be effective, it is important that trainees react favorably and without learning, no change in behavior will occur" (Kirkpatrick, 1994). Research on training evaluation has largely failed to confirm such causal linkages. Two meta-analyses of training evaluation studies using Kirkpatrick's model (Alliger and Janak, 1989; Alliger et al., 1997) have found little evidence either of substantial correlations between measures at different outcome levels or evidence of the linear causality suggested by Kirkpatrick (1994).

Many studies that have evaluated training on two or more of Kirkpatrick's levels have reported different effects from training for different levels. However, few studieson training evaluation have tried to investigate the hierarchy of training outcomes and even fewer studies indicate the application of the four categories other than at the reaction level (Clement, 1982; Brandenburg, 1982; Parker, 1986; Alliger and Janak, 1989; Brinkeroff, 1989; Alliger et al., 1997). For example, Alliger and Janak (1989) noted that only three out of 203 empirical studies examined all four levels. They found that reaction had a very weak correlation with learning ($r = .07$) but found stronger relations between learning and behavior ($r = .13$), learning and results ($r = .40$), and behavior and results ($r = .19$). Furthermore, Clement (1978) found the strongest evidence in support of the hierarchy by using path analysis and the results show that trainee reactions had a causal impact on learning, and learning had a significant influence on behavior change. However, only a few training evaluation studies have provided

indirect support for the hierarchical model and demonstrated that satisfaction with training, learning, and behavior change occurs jointly (Fromkin et al., 1975; Latham, Wexley, and Purcell, 1975). Thus, this study teststhe hierarchy relationship of training evaluation. We hypothesize that:

**Hypothesis 5-1:** There will be a hierarchy relationship of reaction, learning, and job behavior to results.

Discussion about the role of reaction measures has been prevalent in the literature of training evaluation. It is recognized that trainees cannot reap the full benefits of training without considering the role of reaction. Many studies on training effectiveness have concluded that reaction is positively related to learning (Brown, 2005; Kirkpatrick, 1994; Mathieu, Tannenbaum, and Salas, 1992; Noeand Schmitt, 1986; Tracey et al., 2001; Warr et al., 1999; Lin, Chen, and Chuang, 2011). However, some studies found little correlation between reaction and learning (Colquitt, Lepine, and Noe, 2000; Alliger et al., 1997; Alliger and Janak, 1989; Dixon, 1990; Noe and Schmitt, 1986; Warr and Bunce, 1995). However, some researchers have even argued that trainee reactions are unrelated to learning (Holton, 1996; Hook and Bunce, 2001; Noeand Schmitt, 1986).

Furthermore, past research on training reaction and effectiveness may have been limited by the treatment of reaction as a unidimensional construct (Morgan and Casper, 2000). Particular facets or dimensions of trainee reactions appear to hold more promise, such that Alliger et al. (1997) distinguish between affective and utility judgments of reactions. They found that utility reactionshavea modest but significant relationship to immediate learning ($r = .26$); affective reactions to training do not. This study reported a combined scale of affective and utility reactions has a significant relationship to immediate learning ($r = .14$) and to behavior or skill demonstration learning, the Level II distinction made by those researchers--

(r = .12). More recently, Tan, Hall, and Boyce (2003) found that both affective and cognitive/intention reaction scales did significantly correlate to a modest degree with the learning criteria. Hook and Bunce (2001) found that affective and utility reactions were not related to immediate learning. Moreover, Cannon-Bowers, et al. (1995) proposed that trainees' reactions, including satisfaction and perceived utility, were not related to declarative knowledge acquisition. The empirical research on facets or dimensions of trainee reaction remained equivocal.

As discussed above, previous empirical results have been inconclusive for the purpose of investigating the relationship between reaction and learning. Therefore, this study proposes to investigate the two facets of reactions, that is, affective and utility reactions. Thus, we develop the hypotheses below:

**Hypothesis 5-1A:** Combined trainee reactions will be positively related to learning.

**Hypothesis 5-1B:** Trainee affective reactions will be positively related to learning.

**Hypothesis 5-1C:** Trainee utility reactions will be positively related to learning.

In addition to the relationship between learning and behavior, trainees must have the ability to retain knowledge and skills instilled during the training program to facilitate the transfer process. Baldwin and Ford (1988) argue that learning retention outcomes are directly associated with the generalization and maintenance of training effects on the job. They argue that in order for trained skills to be transferred, they first must be learned and retained. Furthermore, Velada et al. (2007) also found that when trainees retain training content, they are more likely to perceive that they have transferred the training to the work context. Based on the literature reviews above, we hypothesize that:

**Hypothesis 5-1D:** Learning will be positively related to behavior.

Fewer previous studies have investigated the relationship between behavior and results compared with those studies on the relationship between reaction and learning and the relationship between learning and behavior. The important reason is there are more variables, both inside and outside the organization, which can influence this relationship (Clement, 1982). Another reason is greater difficulty in evaluating training at the higher levels of Kirkpatrick's model. However, while considering Kirkpatrick's original idea that there are causal relationships through all four levels, including from behavior to results, in this study we hypothesize that:

**Hypothesis 5-1E:** Behavior will be positively related to results.

## 5.4 Methodology: Measures

Variables in this study, as well as their corresponding sources of information, are described below.

*Reaction.* Twenty-seven items adopted from Morgan and Casper (2000) were used to assess trainees' feelings for and like of a training program. Affective reactions measure the extent to which a participant "liked" or was satisfied with different components of the training (e.g. course structure, testing process, instructors, materials, training management and administration process).Examples of affective reactions items are: "How satisfied are you with the instructor's presentation and explanation of course materials?" and "How satisfied are you with the quality of course materials?"Utility reactions consider the extent to which the participants can apply the content of training to their job. Sixteen items assessed the affective reactions of the trainee and five items were used to assess the participants' utility reactions to the training program such as "How satisfied are you with the relevance of the course content to your job?" and "How satisfied are you with the extent to which the course prepared you to

perform new job tasks?" Reponses were made on a five-point Likert scale, with 1 = very dissatisfied and 5 = very satisfied.

*Learning.* Based on Kirkpatrick's model, learning refers to the knowledge, skills, and attitude acquired by trainees. Learning aims at understanding trainees' comprehension of instruction, principles, ideas, knowledge and skills from training. The measurement of learning included immediate learning and retention. The learning measure consisted of sixteen items adopted from previous studies (e.g. Kirkpatrick, 2006; Leach and Liu, 2003), such as "my knowledge and skills increased as a result of this course" and "I feel that newly learned knowledge and skills help me to do my current job better." Reponses were made on a five-point Likert scale, with 1 = disagree strongly and 5 = agree strongly.

*Behavior* refers to the extent to which a change in behavior has occurred because the trainees attended the program, which is measured (assessed) in the workplace (Kirkpatrick, 1994). Behavior consisted of thirteen items adopted from previous studies (e.g. Kirkpatrick, 2006; Leach and Liu, 2003; Velada et al., 2007; Xiao, 1996), such as "using the new knowledge and skills from training has helped me improve my work" and "I make fewer mistakes in production when using new knowledge and skills from training." Reponses were made on a five-point Likert scale, with 1 = disagree strongly and 5 = agree strongly.

*Results* refer to the final results that occurred because the trainees attended the program (Kirkpatrick, 1994). These could include the attainment of organizational objectives and individual benefits. The results consisted of eighteen items adopted from previous studies (e.g. Kirkpatrick, 2006; Leach and Liu, 2003; Velada et al., 2007; Xiao, 1996), such as "This training will have a significant impact on decreasing cycle time" and "The training program improved my job involvement." Reponses were made on a five-point Likert scale, with 1 = disagree strongly and 5 = agree strongly.

In this research, the reliability of all remaining items was examined using one-dimension assessment. As a test of reliability, Cronbach's α was adopted to represent internal consistency. Cronbach's α for each scale of the questionnaire is acceptable (Reaction: .709, Affective Reactions: .639, Utility Reactions: .594, Learning: .665, Behavior: .647, and Results: .639), with all values greater than the threshold of .60. Although Conbach's α for utility reactions less than 0.60, however Conbach's α for aggregate reactions was .709. Thus, Conbach's α for utility reactions is acceptable. According to Hair et al. (1998) and Zainudin (2012) a coefficient of α = 0.70 is widely acceptable. They also suggest that coefficients as low as α = 0.60 are acceptable for exploratory research.

**5.5 Analysis of Measurement Model**

In accordance with Gerbing and Hamilton's (1996) recommendation, we followed a three-stage approach. First, the measurement scales of latent variables were examined using the principal components analysis (PCA). PCA is the technique for extracting factors, and thus, is most commonly used in exploratory factor analysis (EFA) in SPSS 19. The aim of the data extraction is to reduce a large number of items into factors. Some items were eventually eliminated using this process (See Appendix 2 in Appendices). Some items were eventually eliminated usingthis process. Then, all remaining items from the four measures were entered into a confirmatory factor analysis (CFA) in LISREL 9.10 using maximum likelihood (ML) estimation. The results from the CFA showed that all factor loadings and path coefficients were statistically insignificant, with all factor loadings above 0.50 (Hair, Anderson, Tatham, and Black,1998). The results revealed a good fit between model and data and thus support the unidimensionality of the scale. The construct reliability of all measures (affective reactions:

.934, utility reactions: .812, learning: .893, behavior: .808) were above 0.6, and the convergent validity of all measures (affective reactions: .679, utility reactions: .646, learning: .583, behavior: .639) was above 0.5 (Zainudin, 2012). In sum, these results support the factorial validity and reliability of all measures. Therefore, we conclude that the items reliably measure the defined constructs and variables.

Finally, to test the proposed hypotheses, the structural equation model was assessed. The criteria were used to evaluate the fit of the models in this study by taking suggestions from Bollen (1989), Joreskog and Sorbom (1993), and Hu and Bentler (1995).As the result, all the criteria were satisfied. The scale internal structure fit measures abstract is shown in Table 5-1. The CFA results of reaction, learning, behavior, and results were appropriate (RMSEA = 0.020, 0.036, 0.068, and 0.046, respectively).

**Table 5-1:** Goodness of fit of scale internal structure

| | Criteria | Reactions | Learning | Behavior | Results |
|---|---|---|---|---|---|
| GFI | >0.90 | 0.935 | 0.951 | 0.965 | 0.950 |
| SRMR | <0.06 | 0.047 | 0.052 | 0.069 | 0.064 |
| RMSEA | <0.08 | 0.020 | 0.036 | 0.068 | 0.046 |
| AGFI | >0.90 | 0.898 | 0.926 | 0.917 | 0.909 |
| NNFI | >0.90 | 0.992 | 0.968 | 0.677 | 0.949 |
| CFI | >0.90 | 0.994 | 0.975 | 0.829 | 0.966 |
| PNFI | >0.50 | 0.600 | 0.688 | 0.394 | 0.591 |
| PGFI | >0.40 | 0.593 | 0.627 | 0.402 | 0.518 |
| $\chi^2$/df | <2.00 | 1.095 | 1.397 | 2.049 | 1.304 |

*Note.* n = 228 for all models. GFI = goodness of fit index, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation, AGFI = adjusted goodness of fit index, NNFI = non-normed fit index, CFI = comparative fit index, PNFI = parsimony normed fit index, PGFI = parsimony goodness of fit index.

**Table 5-2:** Means, standard deviations, and correlations of variables

| Variables | M | SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1. Affective reactions | 4.193 | 0.230 | | | | |
| 2. Utility reactions | 4.261 | 0.359 | .151* | | | |
| 3. Learning | 4.094 | 0.353 | .234** | .324** | | |
| 4. Behavior | 4.051 | 0.342 | .299** | .127 | .312** | |
| 5. Results | 4.087 | 0.316 | .276** | .080 | .029 | .283** |

Note: Mean and standard deviation of all reaction are 4.209 and 0.206. Combined reactions demonstrated a statistically significant and positive correlation with learning, behavior, and results ($r$ =.333, .307, and .268, respectively $p < 0.01$)

*$p < 0.05$, **$p < 0.01$*

Means, standard deviations, and correlations among all measurements are reported in Table 5-2. Correlation analyses by Pearson product-moment indicated that the facet of reactions, including affective reactions, have a positive significant correlation with utility reactions ($r = .151$, $p < 0.05$), learning ($r = .234$, $p < 0.01$), behavior ($r = .299$, $p < 0.01$), and results ($r = .276$, $p < 0.01$). Another facet of reactions wasthat utility reactions havea positive significant correlation with learning ($r = .324$, $p < 0.01$), but were not significantly correlated with behavior ($r = .127$, $p > 0.05$). Furthermore, learning hasa positive significant correlation with behavior ($r = .312$, $p < 0.01$). However, both utility reactions and learning were not significantly correlated with results ($r = .080$ and $r = .029$ respectively, $p > .05$).

## 5.6 Results

### 5.6.1 Overall fit evaluation results

To test the fit of the hypothesized model, a structural equations analysis was conducted using LISREL 9.10 (Joreskog and Sorbom, 1993). The initial results of the hypothesis to test Kirkpatrick's four-level hierarchy of training evaluation by combining reactions in Model 1 showed that the overall chi-square was statistically significant ($\chi^2 = 281.11$ $df = 186$, $p < .001$); the GFI was 0.891, the SRMR was 0.069, the RMSEA was 0.047, the AGFI was 0.865, the NNFI was 0.757, the CFI was 0.785, the PNFI was 0.518, the PGFI was 0.718, and the $\chi^2/df$was 1.511 (Table 5-3).

**Table 5-3:** Goodness of fit of structural model

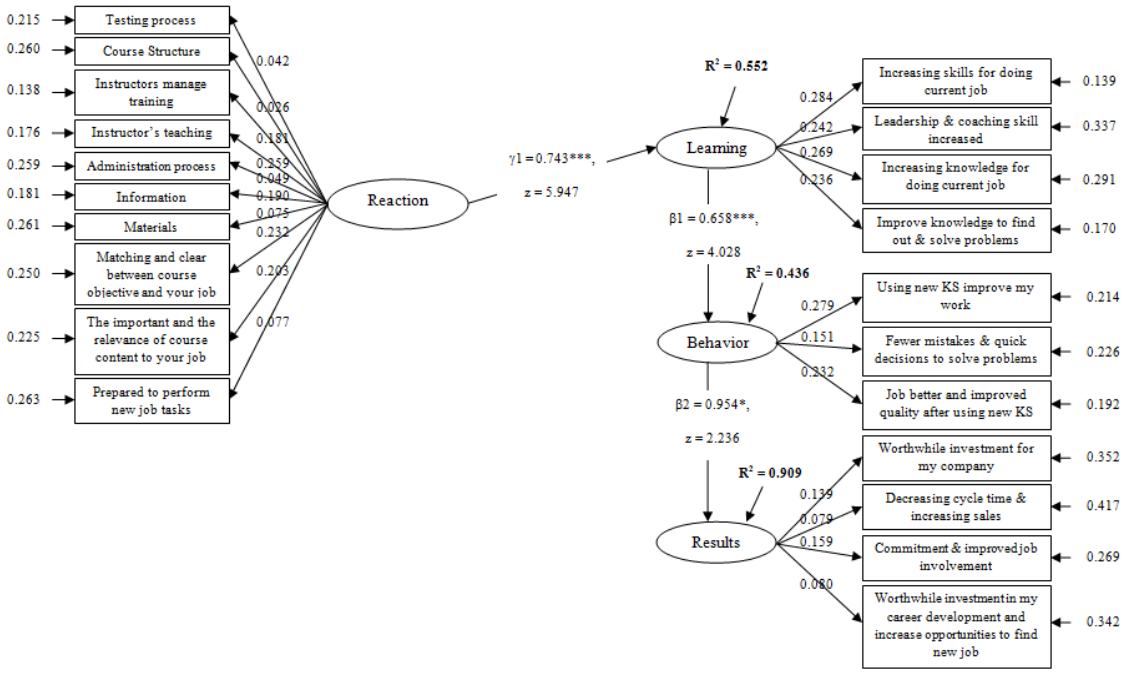
| | Criteria | Model 1 | Model 2 |
|---|---|---|---|
| GFI | >0.90 | 0.891 | 0.894 |
| SRMR | <0.06 | 0.069 | 0.068 |
| RMSEA | <0.08 | 0.047 | 0.046 |
| AGFI | >0.90 | 0.865 | 0.867 |
| NNFI | >0.90 | 0.757 | 0.772 |
| CFI | >0.90 | 0.785 | 0.800 |
| PNFI | >0.50 | 0.518 | 0.525 |
| PGFI | >0.40 | 0.718 | 0.712 |
| $\chi^2/df$ | <2.00 | 1.511 | 1.489 |

In addition, the further analyses tested two facets of reactions, including affective and utility reactions,to predict training outcomes in Model 2. The fit of the hypothesis showed that the overall chi-square was statistically significant ($\chi^2$ = 274.04; *df* = 184, *p* <.001); the GFI was 0.894, the SRMR was 0.068, the RMSEA was 0.046, the AGFI was 0.867, the NNFI was 0.772, the CFI was 0.800, the PNFI was 0.525, the PGFI was 0.712, and the $\chi^2/df$ was 1.489 (Table 5-3). From this perspective, it is therefore advisable to use the $\chi^2$ value in conjunction with other fitness indices. In this study the fitness of the overall model is assumed to be appropriate according to good fitness indices including GFI.

### 5.6.2 Study hypothesis test results

With respect to our specific research hypotheses, there were hierarchy relationships of reaction, learning, and job behavior to results. Hypothesis 1 and the sub-hypotheses, including hypotheses 1A, 1D, and 1E, were supported. First, trainee reaction was positively related to learning ($\gamma 1 = 0.743$, $z = 5.947$, $p < .001$). Reaction explained 55.2% of variance of learning. Second, learning was positively related to behavior ($\beta 1 = 0.658$, $z = 4.028$, $p < .001$). Reaction and learning explained 43.6% of variance of behavior directly and/or indirectly. Third, behavior was positively related to results ($\beta 2 = 0.954$, $z = 2.236$, $p < .05$). From the residual, the results can be explained by reaction, learning, and behavior directly and/or indirectly at a 90.9% rate. The results for the hypothesized model are depicted in Figure 5-2.

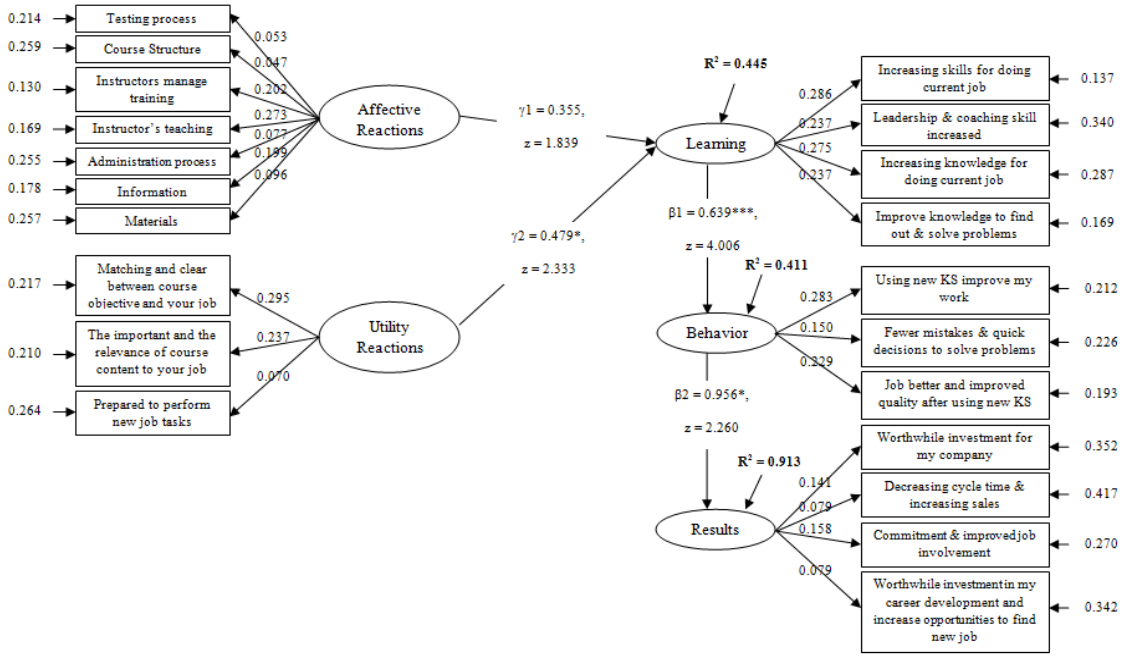
**Figure 5-2:** Estimated results of the model for testing Kirkpatrick's four-level hierarchy of training evaluation (Model 1)




*$p < 0.05$, ***$p < 0.001$

For the next model, we also examined two dimensions of reactions, that is affective and utility reactions,to predict training effectiveness. The results partially supported the two sub-hypothesis. The results provided support to hypotheses 1C while hypothesis 1B was not supported. As can be seen in Figure 5-3, first, affective reactions were not significantly related to learning ($\gamma1 = 0.355$, $z = 1.839$). Only utility reactions were positively related to learning ($\gamma2 = 0.479$, $z = 2.333$, $p < .05$). Reactions explained 44.5% of variance of learning. Second, learning was positively related to behavior ($\beta1 = 0.639$, $z = 4.006$, $p < .001$). Utility reactions and learning explained 41.1% of variance of behavior directly and/or indirectly. Third, behavior was positively related to results ($\beta2 = 0.956$, $z = 2.260$, $p < .05$). From the residual, the results can be explained by reaction, learning, and behavior directly and/or indirectly at a 91.3% rate.

**Figure 5-3:** Estimated results of the model for expanding the facets of reactions in predicting training effectiveness (Model 2)




*$p < 0.05$, ***$p < 0.001$*

## 5.7 Discussion

This study makes two specific contributions. First, it expands on the approach to the measurement of the impact of training using Kirkpatrick's model to expand the hierarchy relationship of reaction, learning, and job behavior to results. The results from CFA of the proposed model showed that combined reactions were significantly related to learning, learning was significantly related to behavior, and behavior was significantly related to results. The results of this study fully supported previous findings in the literature on training effectiveness (Alliger and Janak, 1989; Alliger et al., 1997; Leach and Liu, 2003; Kirkpatrick, 1996; Tan et al., 2003; Tracey et al., 2001; Warr, Allan, and Birdi, 1999). That is, reaction was significantly related to learning. This result is consistent with Alliger et al.'s, (1997) meta-

analysis and supports Kirkpatrick's (1967) original suppositions on the hierarchical nature of the relationship among the four primary training criteria. This finding suggests that trainees who are satisfied in the training program have more positive learning outcomes. Reaction and learning from training play a critical role in the process of training evaluation.

In addition, learning from training has positive relationship with behavior. This is consistent with prior research on the evaluation of the training transfer (Baldwin and Ford, 1988; Tan et al., 2003; Velada et al., 2007) and supports Kirkpatrick's (1967) original suppositions onbehavioral change will not occur without learning. Thus, learning is a fundamental requirement for transferring training to the workplace. However, the confidence on unidimensional measures of training reactions and learning does not accurately account for the multifaceted nature of these outcomes. This study also demonstrate that multiple dimensions of relevant training outcomes should be considered in order to gain a more complete understanding of training effectiveness (Tracey et al., 2001).

However, the relationship between behavior and results was even weaker than the relationship between learning and behavior. There are many variables in the organization which can interfere with this relationship, such asorganizational culture, opportunity to practice, workload, and resource availability. Within the organization, we should consider the influence of the supervisor or manager, peers, and organizational support as well because social support factors have become increasingly the important indicator for transfer of training among researchers.

Second, the other model tested the facets of reactions thatwere articulated in Kirkpatrick's model of training effectiveness. Two kinds of reactions, affective and utility reactions, were hypothesized to impact learning. The results of the present study underlined that trainee utility reactions had a significant relationship to learning. This result is consistent

with prior studies that utility reactions were positive significantly related to learning (Alliger et al., 1997; Tracey et al., 2001).

In contrast, trainee affective reactions were not significantly related to learning. This means that trainees, even if theyare satisfied with different components of training, such as course structure, testing process, instructors, materials, training management, and the administration process, didn'ttend to achieve higher learning. It may be that trainees may enjoy a training activity which is not very connected with his or her work activities, or may dislike learning something which is nevertheless of considerable importance to their job (Warr and Bunce, 1995) and in turn learning was not well enhanced.

Practitioners are required to improve reactions, especially utility reaction in order to achieve further training outcomes. In particular, practitioners should examine participant reactions in terms of utility rather than affective reactions such as whether the participant enjoyed the training. Furthermore, practitioners should consider whether their reaction forms collect utility judgments or trainees' reactions to whether their training can be used on the job and has merit, and these should be incorporated into comprehensive reaction forms (Alliger et al., 1997; Mogan and Casper, 2000).

## 5.8 Conclusions

In conclusion, the result of this study expands our understanding of the progressive causal relationship of reaction, learning,and behavior to results. In particular, this study highlighted the utility reactions in predicting training effectiveness. This study takes a step toward a more comprehensive understanding of training effectiveness. Furthermore, future research on training evaluation should consider individual trainee characteristics and environmental variables beyond the training course that may have interfered with the results.

# Chapter 6

# Effects of Individual and Work Environment Characteristics on Training Effectiveness

This chapter integrated the individual and work environment characteristics on four-levels of Kirkpatrick's model. We also investigate moderator variables on the relationships between reaction (L1) and learning (L2), and behavior (L3), such as learning motivation, self-efficacy, motivation to transfer, and social and organizational support. The recognition of these factors challenges HRD professionals to use this knowledge to enhance training effectiveness, because Kirkpatrick's model does not consider individual or contextual influences in the evaluation of training and those factors are not well recognized in practices. This chapter is divided into seven sections. Section 6.1 is introduction and presents the objectives of this chapter. Section 6.2 presents the conceptual framework and the next section (section 6.3) provides the review of previous studies and develops the hypotheses in this study. Section 6.4 provides the measures of this study. Results and discussion will be provided in section 6.5 and 6.6. The last section, 6.7 is conclusion.

## 6.1 Introduction

Kirkpatrick's four-level model has been the most widely accepted and used primary organizing framework for training evaluations for over fifty years. Organizations often evaluate training effectiveness using one or more of Kirkpatrick's criteria because they are simple, clear, and easy to implement, as training evaluators expect. However, Kirkpatrick's

evaluation model has been increasingly questioned and criticized. For example, its use as a primary typology for functionalizing evaluation has been challenged (Holton, 1996; Kaufman and Keller, 1994; Phillips and Phillips, 2002; Swanson and Holton, 1999). The noteworthy question in HRD is whether the current conceptualization of evaluation is sufficient for answering the many questions that involve the effectiveness of the organizations' training and development efforts (Preskill, 1997).

In the discussions about the insufficiency of effective training evaluation, there are three limitations in Kirkpatrick's model that have implications for the ability of training evaluators to deliver benefits and, further, to satisfy the interests of organizations. These include the incompleteness of the model, the assumption of causality, and the assumption of the increasing importance of information as the levels of outcomes rise (Bates, 2004). Based on those limitations, research over the past two decades has argued Kirkpatrick's model ignored the work environment and individual factors influencing training effectiveness.For example, some previous studies indicated that a wide range of organizational, individual, and training design and delivery factors can influence training effectiveness before, during, and after training (Salas and Cannon-Bowers, 2001; Tannenbaum and Yukl, 1992). Thus, without considering the role of trainees' individual and work environment characteristics as influencing training effectiveness, it is not possible to fully understand why training is effective or not. Kirkpatrick's model doesn't explicitly incorporate these factors and, in effect, assumes the examination based on the model is not sufficient for appropriate training evaluation.

In particular, the previous studies examined multiple individual and work environment characteristic variables, such as learning motivation, self-efficacy, motivation to transfer, and social and organizational support. They have been analyzed as the determinants of learning

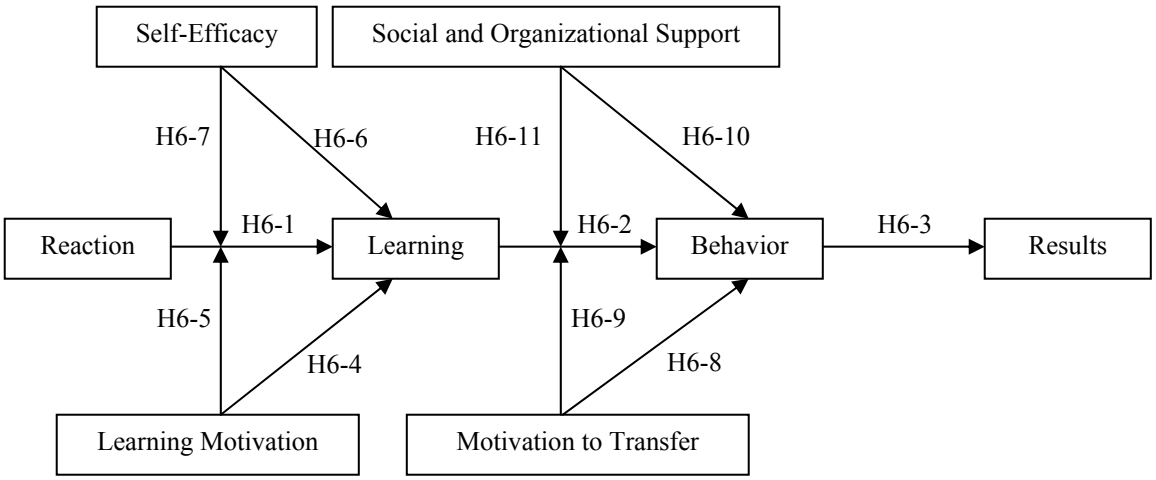
and behavior (Cannon-Bowers et al., 1995; Chiaburu and Marinova, 2005; Colquitt, LePine, and Noe, 2000; Gist, 1987; Hawley and Barnard, 2005; Holton, 1996; Kanfer and Ackerman, 1989; Lim and Morris, 2006; Nijman et al., 2006; Noe, 1986; Russ-Eft, 2002), independently from reaction-learning and learning-behavior relationships. Therefore, individual and work environment characteristics including learning motivation, self-efficacy, motivation to transfer, and social support have been demonstrated to have a relationship to training outcomes. Determining these four specific variables as a moderating influence on the relationship of reaction, learning, and behavior is important to understand how to increase the possibility that learning and behavior change in the job improvement will result from participation in training. .

Based on the arguments above, the main purpose of this chapter is to investigate four levels of Kirkpatrick's model with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, and social support. All the variables identified in this chapter have been proven the direct effect on training effectiveness in the previous studies, though not in a comprehensive manner. To achieve the research purpose, the author poses the following research questions: Are there progressive causal relationships among training outcomes (reaction, learning, behavior, and results) even after incorporating individual and wok environment characteristic variables? Also, how do individual and work environment characteristic variables, including learning motivation, self-efficacy, motivation to transfer, and social support, affect training outcomes and moderate the relationship between training outcomes?

## 6.2 Conceptual Framework

The conceptual framework for this study is shown in Figure 6-1. A focus of this study is testing four levels of Kirkpatrick's model and investigating individual and work environment characteristic variables, which are: learning motivation, self-efficacy, motivation to transfer and social support, as predictors of some of training outcomes and moderators of the relationship between the same training outcomes. Specific hypotheses for each of the relationships are illustrated in Figure 6-1.

**Figure 6-1:** Conceptual framework




## 6.3 Literature Review and Development of Hypotheses

### 6.3.1 Training Effectiveness: Kirkpatrick's Model

Training effectiveness refers to the extent to which the training objectives or training's goal are achieved. Most of the research on training evaluation has relied on Kirkpatrick's (1967) four-level typology to explain the effectiveness of training. Level 1, reaction, is trainees' feelings about and like of a training program. Level 2 is learning that has taken place during training. Alliger and Janak, (1989) defined learning as the "principles, facts, and techniques understood and absorbed by the trainees". No change in behavior can be expected

unless one or more of these learning objectives has been accomplished (Kirkpatrick, 1994). This level of evaluation allows trainees to demonstrate their understanding of specific KSAs within the learning program. Level 3, behavior change or transfer, refers to the extent to which a change in behavior has occurred because the trainees attended the program, which is measured (assessed) in the workplace. This level attempts to determine whether trainees (who can apply the acquired specific knowledge and/or skills) use their new knowledge and/or skills when returning to the work environment. Level 4, results, refers to the final results that occurred because the trainees attended the program (Kirkpatrick, 1994). These could include the attainment of organizational goals and objectives, such as a reduction in absenteeism and personnel turnover, productivity gains, and cost reductions.

Previous research on training evaluation found that reaction to training may indeed play an important role in understanding training effectiveness. A number of studies have examined the relationships between reactions and learning. Most of the studies on training effectiveness hypothesized that the reaction is positively related to learning (Kirkpatrick, 1996; Leach and Liu, 2003; Mathieu, Tannenbaum, and Salas, 1992; Tan et al., 2003; Warr, Allan, and Birdi, 1999). This study tests the relationship between reaction and learning variables as measures for evaluating training effectiveness. Thus, in this study we hypothesize that:

**Hypothesis 6-1:** Trainee reaction will be positively related to learning.

Liebermann and Hoffmann (2008) found that learning had a direct impact on transfer. According to Expectancy Theory (Vroom, 1964), if learners' individual motives are believed to lead to strengthened performance, they will be more motivated. Therefore more successful learners feel that they can work better through utilizing acquired knowledge on their jobs. In one of Kirkpatrick's more recent publications he argued that, "If training is going to be

effective, (it is important that trainees react favorably and) without learning, no change in behavior will occur" (Kirkpatrick, 1994). Furthermore, the empirical study by Maister (2008) indicated that when more knowledge is learned from training more behavioral change can be found in workplaces.

In addition to learning from training, trainees must retain KSAs instilled during the training program to facilitate the transfer process. Baldwin and Ford (1988) argue that learning retention outcomes are directly associated with the generalization and maintenance of training effects on the job. They argue that in order for training skills to be transferred, they first must be retained as well as learned. Velada et al. (2007) also found that when trainees retain training content, they are more likely to perceive that they have transferred the training to the work context. Based on the literature review above, we hypothesize that:

**Hypothesis 6-2:** Learning from training has a positive relationship with behavior.

Fewer previous studies have investigated the relationship between behavior and results compared with those studies on the relationship between reaction and learning and the relationship between learning and behavior. The first reason is there can be a long delay between the improvement in job behavior and desired organizational results. The second reason is there are more variables, both inside and outside the organization, which can influence this relationship (Clement, 1982). The final reason is greater difficulty in evaluating training at the higher levels of Kirkpatrick's model. However, considering Kirkpatrick's original idea that there are causal relationships through all four levels, including between behavior and results, in this study we hypothesize that:

**Hypothesis 6-3:** Behavior will be positively related to results.

### 6.3.2 Factors Influencing Training Effectiveness

Evaluation on training effectiveness is aimed at developing and understanding the process of training with respect to the achievement of training's goal or set of goals. In particular, the emphasis of effectiveness is that what is learned in training is ultimately applied on the job (Bates and Coyne, 2005). Furthermore, effectiveness is concerned more with the inputs into training, including individual characteristic variables(for example, learning motivation, self-efficacy, motivation to transfer) and work environment characteristicssuch as social support.

#### *1) Individual Characteristics*

The effects of individual characteristics have been studied over the past four decades and integrated in training effectiveness models (Campbell, 1988). The empirical literatures in the field of industrial and organizational psychology have shown the interest in how individual traits influence training proficiency (e.g., Chuang, Liao, and Tai, 2005; Colquitt, LePine, and Noe, 2000). In particular, individual characteristics, such as self-efficacy, learning motivation, trainability, job attitudes, personal characteristics, and transfer of training conditions, have been found to have an impact on training outcomes. However, other factors have been examined as well. For this study, learning motivation, self-efficacy, and motivation to transfer are the focuses because all of these factors affect training outcomes and no previous studies have combined all of them in training effectiveness models.

It is recognized that trainees cannot reap knowledge from training without having learning motivation. Learning motivation or motivation to learn refers to the desire of the trainee to learn the contents of the training program (Noe, 1986). In the Cannon-Bowers model of training effectiveness, motivation to learn is hypothesized to be positively related to knowledge acquisition. Thus learning motivation is important for acquiring fundamental levels

of knowledge. Many previous studies have investigated the relationship between learning motivation and learning. For instance, one study found that learning motivation is related to learning and program completion (Ryman and Biesner, 1975). Colquitt et al. (2000) came to the conclusion that trainee learning motivation was significantly related to both declarative knowledge and skill acquisition. Furthermore, researchers have also confirmed motivation to learn has a positive effect on learning outcomes (e.g., Mathieu et al., 1992; Randel, Main, Seymour, and Morris, 1992; Traci et al., 2009; Zazanis, Zaccaro, and Kilcullen, 2001).Therefore,we hypothesize that:

**Hypothesis 6-4:** Learning motivation will be positively related to learning.

Few of the previous studies have shown that learning motivation has a moderating effect on the relationship between reactions and learning. Mathieu, Tannenbaum, and Salas (1992) found that reactions were important for training effectiveness, but not in and of themselves. The best results were observed when trainees were both motivated to do well and reacted positively to the program. If trainees were not motivated at the start, or if attention was directed solely at making training enjoyable at the expense of developing skills, less than optimal results were obtained. Furthermore, Quinones et al., (1995) also found that when employees received the assignment from the organization to attend training because of their poor performance, they were less motivated and learned less when they felt it was unfair. Thus, learning motivation signals greater learning for trainees who react positively to a program than for those who react less positively. However, the studies on learning motivation lack a consistent framework incorporating a moderating effect on the relationship between reaction and learning. Logically, we assume that learning motivation will more strongly affect learning if trainees react positively to the program. Learning motivation will still positively

affect learning among trainees who reacted negatively to the program, but to a lesser degree. Therefore, we hypothesize that:

**Hypothesis 6-5:** Learning motivation will moderate the relationship between reaction and learning.

Self-efficacy emanates from social learning theory and is defined as one's judgment of his (her) capability to successfully perform target behaviors (Bandura, 1986). In a review of training effectiveness studies, self-efficacy is one of the main determinants of proximal training outcomes (Haccoun and Saks, 1998) and it has been shown to positively correlate with learning and behavior (e.g., Axtell, Maitlis, and Yearta, 1997; Cheng, 2000; Chuang, Liao and Tai, 2005; Gist et al., 1991; Guerrero and Sire, 2001; Martocchio and Webster, 1992; Quinones, 1995). More specifically, a positive relationship between self-efficacy and learning in training has been well-supported in the training literature (e.g., Colquitt, LePine, and Noe, 2000; Gist, Schwoerer, and Rosen, 1989; Gist, Stevens, and Bavetta, 1991; Martocchio, 1994; Simmering and Posey, 2009). Therefore, we hypothesize that:

**Hypothesis 6-6:** Self-efficacy will be positively related to learning.

Within the framework of social cognitive theory, self-efficacy can be conceptualized as relevant before, during, and after training. However, there have been a few studies that have illustrated the role of trainees' self-efficacy in moderating the relationships between work-related behaviorand its antecedents (for example, Gist, 1987; Gist and Mitchell, 1992; Gist et al., 1991; Saks, 1995). Two studies have found evidence that self-efficacy is a moderating variable for the effect of the training method on training outcomes, including learning. Gist et al. (1989) found that participants with low self-efficacy had greater confidence in their ability to master the software training in the modeling compared with the tutorial conditions. Furthermore, Gist et al. (1991) concluded that posttraining interventions following basic

training in negotiation skills, such as goal-setting or self-management, are positively related to salary performance when participants have low self-efficacy. These studies suggest that the effectiveness of training may depend on the strength of trainees' self-efficacy. These findings did not cover self-efficacy's moderating affect, specifically on the relationship between the reaction to training and consequent training outcomes including learning. However, it is expected that trainees with positive reactions are more likely to be affected in their learning performance by their self-efficacy level. If trainee's belief in his or her ability to learn and succeed in training, it can be viewed as a prerequisite for taking advantage of training. Guthrie and Schwoerer (1994) found that self-efficacy of training is linked to perceptions of training utility or views of training as helpful or instrumental. Confidence in one's ability to succeed at training is associated with positive reaction and more likely to enhance learning in training. Therefore, our focus here is on self-efficacy as an important moderator variable in the relationship between reactions and learning. We propose the hypothesis that:

**Hypothesis 6-7:** Self-efficacy will moderate the relationship between reactions and learning.

In general, motivation is defined as variability in behavior which is not attributable to stable individual traits or strong situational coercion (Quinones, 1995). In a training program, motivation can influence the willingness of a trainee to participate in the training and also affect whether or not a trainee utilizes his (her) learning on the job (Baldwin and Ford, 1988). With regard to training effectiveness, motivation to transfer is the learner's intended efforts to utilize knowledge and skills learned in training setting in a real world work situation (Noe, 1986). In previous empirical studies, such as Axtell, Maitlis, and Yearta (1997) and Noe (1986), motivation to transfer is described as the trainee's desire to use the knowledge and skills that have been learned in a training program on the job. Research on the effects of motivation to transfer on actual transfer is limited, but a study by Axtell, et al., (1997) found

motivation to transfer was a significant predictor of positive transfer that trainees felt they had achieved after participation in the training. Therefore, it is evident that motivation to transfer plays an important role in improving work behavior and training effectiveness. Therefore, we hypothesize that:

**Hypothesis 6-8:** Motivation to transfer will be positively related to behavior.

Learning and motivation are both essential for training transfer (Gegenfurtner et al., 2009). Without learning, nothing can be transferred from training to the workplace. Without motivation, nothing will be transferred from learning to the workplace. However, the studies on motivation to transfer lack a consistent framework for understanding it as the moderator variable affecting the transfer process. In the same way as the discussion for motivation to learn, according to Expectancy Theory (Vroom, 1964), if learners' individual motives are believed to lead to strengthened performance, they will be more motivated. The focus in past research remains unclear in terms of motivation to transfer's moderating effect, specifically the relationship between learning and behavior change. However we can expect here that trainees who succeed in learning from training will be likely to conduct more behavior change along with training contents when they have high motivation to transfer, compared with when having low motivation. In other words learning and motivation to transfer have positive synergy effect to enhance behavior change. Therefore, we hypothesize that:

**Hypothesis 6-9:** Motivation to transfer will moderate the relationship between learning and behavior.

***2) Work Environment Characteristic***

During the past thirty years, many researchers have tried to provide an answer to the question of which factors influence the transfer process (e.g. Baldwin and Ford, 1988; Cheng and Ho, 2001; Holton et al., 2000; Colquitt et al., 2000; Cheng and Hampson, 2008). Work

environment characteristics have often been referred to as the transfer climate or factors perceived by trainees to encourage or discourage their use of KSAs learned in training and in the workplace (Cromwell and Kolb, 2004). Clarke (2002) indicated that social support is the most important factor in the transfer climate, which influences the use of training in the workplace.

Social support has been conceptualized in many ways. One focus in the previous studies was on the type of support providers, such as supervisor or peer support. However, there are still gaps in the empirical studies, in particular concerning organizational support. The previous studies confirmed that support from supervisors and peers is the work environment variable that has the most powerful effect on the transfer process (e.g. Awoniyi et al., 2002; Baldwin and Ford, 1988; Bates et al., 2000; Clarke, 2002; Cohen, 1990; Cromwell and Kolb, 2004; Elangovan and Karakowsky, 1999; Gregoire, Propp, and Poertner, 1998; Gumuseli and Ergin, 2002; Holton et al., 1997; Huczynski and Lewis, 1980; Quinones et al., 1995; Richman-Hirsch, 2001; Russ-Eft, 2002; Salas and Cannon-Bowers, 2001; Smith-Jentsch, Salas, and Brannick, 2001; Taylor, 1992).

Although past research has focused more on the importance of supervisor and peer support, an increase in the use of a framework is found in terms of the effects of organizational support on the transfer process (e.g. Bates et al., 2000; Facteau et al., 1995; Holton et al., 1997). Organizational support theory argues that employees pay attention to treatment offered by the organization in an effort to determine the degree of their contributions to the organization. An important component of this argument is the notion that employees believe that treatment provided to them by agents of the organization is representative of the organization's general favorable or unfavorable orientation towards them, as opposed to the independent motives of these individuals (Eisenberger et al., 1986). Thus, organizations

provide material and socio-emotional benefits, such as the value placed on learning and development, rewards, and materials and supplies allocated for learning and transferring, to employees in exchange for their commitment and work effort on behalf of the organization. Based on the literature review above, we hypothesize that:

**Hypothesis 6-10:** Social and organizational support will be positively related to behavior.

Prior research confirmed that social support, such as that from supervisors and peer support, influences the training transfer process. In other words, we expect that social support may influence the relationship between learning and behavior. For example, Huczynski and Lewis (1980) found that 35 percent of trainees attempted to transfer what they had learned when back on the job and the majority indicated that supervisor support was a significant factor in transferring the skills they learned to the job. Campbell and Cheek (1989) supported the importance of supervisors' involvement in transfer of training. They maintain that without supervisory support, the transfer of newly acquired behaviors to the worksite would be extremely difficult at best. Furthermore, Cromwell and Kolb (2004) found that support from a trainee's peers is influential in the transfer process. Trainees who perceived higher levels of peer support indicated that they were applying, to a greater extent, the newly learned knowledge and skills. However, empirical results are still limited to exhibiting social and organizational support as a moderating effect on the relationship between learning and behavior. When researchers argue for the influence of social support on the training transfer process, there should be an investigation not only of the direct effect of the support, but also of its interaction with the learning level. That means the interaction between the extents of learning, high or low in terms of KSAs, and the degree of social and organizational support have an effect on behavioral change. This particular aspect has been lacking in the literature.

While also considering the effect of social and organizational support on training transfer above, we assume that trainees who learned more from the training program will change their behavior more if they received stronger social and organizational support. Social and organizational support will still positively affect behavior among trainees who learned less from the training program, but to a lesser degree. Therefore, we hypothesize that:

**Hypothesis 6-11:** Social and organizational support will moderate the relationship between learning and behavior.

### 6.4 Methodology: Measures

The measures of Kirkpatrick's (1976, 1994) model including reaction, learning, behavior, and results were explained in Chapter 5. The moderator variables as well as their corresponding sources are described below.

*Learning Motivation* or motivation to learn refers to the desire of the trainee to learn the contents of the training program (Noe, 1986). Learning motivation consisted of six items adopted from previous studies (e.g. Holton et al., 2000; Bell and Ford, 2007; Liao and Tai, 2006; Lima, Leeb, and Nam, 2007).

*Self-efficacy* refers to an individual's belief that he or she can perform a specific task (Bandura, 1986). In particular, self-efficacy in this study refers to an individual's belief in his or her ability to learn and succeed in training. Consistent with Bandura (1986), because self-efficacy measures must be task-specific, no standardized measures were available and an appropriate instrument had to be constructed (Frayne and Geringer, 2000). We constructed the self-efficacy measure specifically for the trainees who recently received KSAs learned from training. Self-efficacy consisted of six items.

*Motivation to transfer* refers to the learner's intended efforts to utilize knowledge and skills learned in a training setting to the workplace (Noe, 1986). The motivation to learn consisted of six items adopted from Gegenfurtner et al. (2009).

*Social* and organizational *support.* This study identified social support from supervisors and co-workers. Supervisor support has the critical role of providing reinforcement for learning on the job. Co-worker support focuses predominantly on supporting the use of learning on the job. Organizational support focuses on an organization's provision of material goods, such as transportation, money, or physical assistance to employees for supporting the transfer of training in the workplace as well as training opportunities and related information for workers. The social support measure consisted of twenty-five items adopted from previous studies (e.g. Elwood et al., 2000; Xiao, 1996; Kupritz, 2002).

In this research, all of the measures, excluding reaction responses, were made using a five-point Likert scale, with 1 = disagree strongly and 5 = agree strongly. As a test of reliability, Cronbach's α was adopted to represent internal consistency. Cronbach's α for each scale of the questionnaire is acceptable (reaction: .709, learning: .665, behavior: .647, results: .639, learning motivation: .665, self-efficacy: .626, motivation to transfer: .801, and social support: .663), with all values greater than a threshold of .60. According to Hair et al. (1998) and Zainudin (2012) a coefficient of $\alpha = 0.70$ is widely acceptable. They also suggest that coefficients as low as $\alpha = 0.60$ are acceptable for exploratory research. Therefore we conclude that the items are reliably measuring the defined constructs and variables.

*Measurement Model Assessment.* In accordance with Gerbing and Hamilton's (1996) recommendation, we followed a three-stage approach. First, the measurement scales of latent variables were examined using the principal components analysis (PCA). PCA is the technique for extracting factors, and thus, is most commonly used in exploratory factor

analysis (EFA) in SPSS 19. The aim of the data extraction is to reduce a large number of items into factors. Some items were eventually eliminated using this process (See Appendix 2 in Appendices). Some items were eventually eliminated using this process. Then, all remaining items from the eight measures were entered into a confirmatory factor analysis (CFA) by using maximum likelihood (ML) estimation. For testing whether or not individual and work environment characteristics influence training effectiveness, we applied a conventional method of mean centering (Cohen, Cohen, West, and Aiken, 2003) to all multiplicative interaction variables in order to avoid multicollinearity. Finally, this study used path analysis via AMOS version 21. The criteria were used to evaluate the fit of the models in this study by taking suggestions from Bollen (1989), and Hu and Bentler (1995) and all the criteria were satisfied. The scale internal structure fit measures abstract is shown in Table 6-1.

**Table 6-1:** Goodness of fit of scale internal structure

| | Criteria | Reaction | Learning | Behavior | Results | Learning Motivation | Self-Efficacy | Motivation to Transfer | Social and Organizational Support |
|---|---|---|---|---|---|---|---|---|---|
| GFI | >0.90 | 0.935 | 0.951 | 0.965 | 0.950 | 0.994 | 1.000 | 0.983 | 0.958 |
| SRMR | <0.06 | 0.047 | 0.052 | 0.069 | 0.064 | 0.038 | 0.024 | 0.060 | 0.063 |
| RMSEA | <0.08 | 0.020 | 0.036 | 0.068 | 0.046 | 0.040 | 0.007 | 0.118 | 0.037 |
| AGFI | >0.90 | 0.898 | 0.926 | 0.917 | 0.909 | 0.970 | 0.980 | 0.915 | 0.933 |
| NFI | >0.90 | 0.867 | 0.890 | 0.821 | 0.949 | 0.982 | 0.990 | 0.875 | 0.822 |
| CFI | >0.90 | 0.994 | 0.975 | 0.829 | 0.966 | 0.995 | 1.000 | 0.958 | 0.947 |
| PNFI | >0.50 | 0.600 | 0.688 | 0.394 | 0.591 | 0.327 | 0.330 | 0.315 | 0.613 |
| PGFI | >0.40 | 0.593 | 0.627 | 0.402 | 0.518 | 0.199 | 0.200 | 0.197 | 0.595 |
| $\chi^2$/df | <5.00 | 1.095 | 1.397 | 2.049 | 1.304 | 1.370 | 1.010 | 4.173 | 1.308 |

*Note.*n = 228 for all models. GFI = goodness of fit index, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation, AGFI = adjusted goodness of fit index, NFI = normed fit index, CFI = comparative fit index, PNFI = parsimony normed fit index, PGFI = parsimony goodness of fit index.

**Table 6-2:** Means, standard deviations, internal consistency, and correlations among all observed variables *(N = 228)*

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Reaction | 4.193 | 0.230 | | | | | | | |
| 2. Learning | 4.261 | 0.359 | .345** | | | | | | |
| 3. Behavior | 4.094 | 0.353 | .316** | .319** | | | | | |
| 4. Results | 4.051 | 0.342 | .247** | .003 | .315** | | | | |
| 5. Learning motivation | 4.194 | 0.678 | .135* | .211** | .114 | .051 | | | |
| 6. Self-efficacy | 4.004 | 0.496 | .298** | .393** | .228** | .129 | .219** | | |
| 7. Motivation to transfer | 4.520 | 0.530 | .082 | .135* | .035 | .002 | .096 | .117 | |
| 8. Social and organization support | 4.071 | 0.282 | .269** | .329** | .396** | .293** | .138* | .293** | .032 |

*$p < 0.05$, **$p < 0.01$

**Table 6-3:** Goodness of fit of structural model

| | Criteria | Hypothesized Model |
|---|---|---|
| GFI | >0.90 | 0.883 |
| SRMR | <0.06 | 0.115 |
| RMSEA | <0.08 | 0.098 |
| AGFI | >0.90 | 0.834 |
| NFI | >0.90 | 0.479 |
| CFI | >0.90 | 0.556 |
| PNFI | >0.50 | 0.399 |
| PGFI | >0.40 | 0.622 |
| $\chi^2/df$ | <5.00 | 3.184 |

**Figure 6-2:** Estimated results of the model (standardized) for testing moderating effect on training evaluation

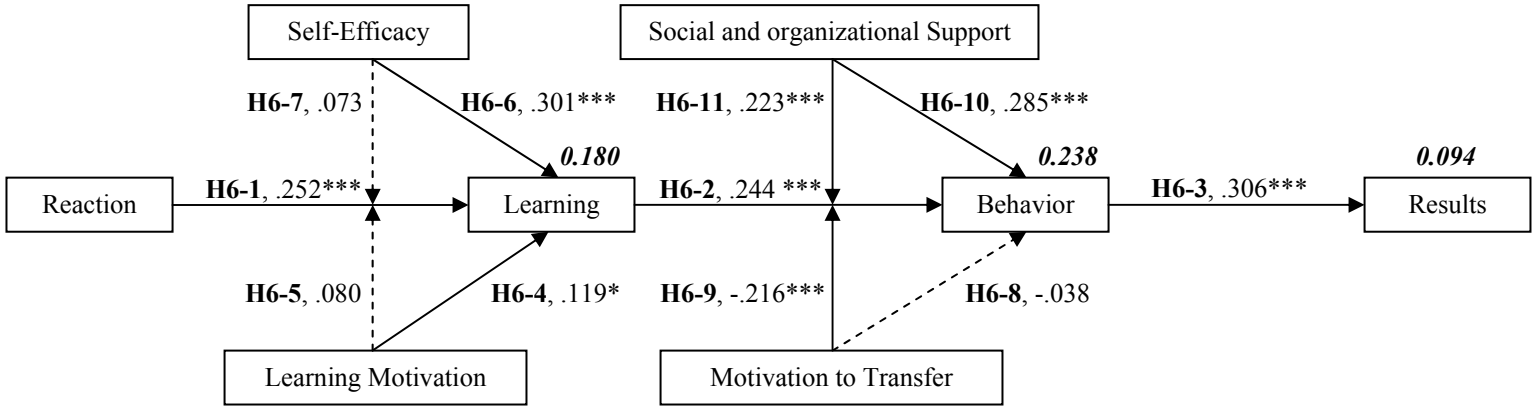



**Table 6-4:** Summary of effects

| | Learning | | | Behavior | | | Results | | |
|---|---|---|---|---|---|---|---|---|---|
| | Direct | Indirect | Total | Direct | Indirect | Total | Direct | Indirect | Total |
| Reaction | .252 | - | .252 | - | .061 | .061 | - | .019 | .019 |
| Learning motivation | .119 | - | .119 | - | .029 | .029 | - | .009 | .009 |
| Self-efficacy | .301 | - | .301 | - | .073 | .073 | - | .022 | .022 |
| Learning | - | - | - | .244 | - | .244 | - | .075 | .075 |
| Social and organizational support | - | - | - | .285 | - | .285 | - | .087 | .087 |
| Learning * Motivation to transfer | - | - | - | -.216 | - | -.216 | - | -.066 | -.066 |
| Learning * Social and organizational support | - | - | - | .223 | - | .223 | - | .068 | .068 |
| Behavior | - | - | - | - | - | - | .306 | - | .306 |

## 6.5 Results

Means, standard deviations and intercorrelations among all measures of latent variables are reported in Table 6-2. Prior to assessing the hypothesized model, we assessed the fit of the model. As shown in Table 6-3, the fit statistics presented indicate that the hypothesized model yields a poor fit to the data. However, in this study the fitness of the overall model is assumed to be appropriate according to RMSEA; its 90 percent confidence interval and values between .05 and .10 indicate a reasonable fit, and values below .05 indicate a close approximate fit (Kline, 2005).

With respect to our specific research hypotheses, there were hierarchy relationships of reaction, learning, and behavior to results. Hypothesis 6-1, 6-2, and 6-3 were supported. First, trainee reaction was positively related to learning ($\beta = 0.252$, $p < .001$). Second, learning was positively related to behavior ($\beta = 0.244$, $p < .001$). Third, behavior was positively related to results ($\beta = 0.306$, $p < .001$). The results for the hypothesized model are depicted in Figure 6-2.

This model also showed that learning motivation and self-efficacy were positively related to learning ($\beta = 0.119$, $p < .05$ and $0.301$, $p < .001$, respectively). These results supported Hypothesis 6-4 and 6-6. Furthermore, social and organizational support was positively related to behavior ($\beta = 0.285$, $p < .001$) but motivation to transfer was not a significant predictor of behavior ($\beta = -0.038$, $p > .05$). Thus, Hypothesis 6-10 was supported and Hypothesis 6-8 was not supported.

As Figure 2 illustrates, the hypothesized moderating effects in the main analysis model partly exists in the relationship between training and its outcome. Specifically, the relationship between reaction and learning was not moderated by learning motivation and self-efficacy, as the interaction terms concerned were not statistically significant ($\beta = 0.080$, and 0.073 respectively,

$p > .05$). Thus, Hypothesis 6-5 and 6-7 were not supported. However, the relationship between learning and behavior was moderated by motivation to transfer and social and organizational support ($\beta$ = -0.216, and 0.223 respectively, $p < .001$); these results supported Hypothesis 6-9 and 6-11. The sign of the coefficient indicated a negative moderating effect of perceived motivation to transfer on the relationship between learning and behavior.

Indirect and total effects of variables that were significant are shown in Table 6-4. All of the indirect and total effects of variables are found to be positively statistically significant, excluding the negative indirect effect of the interaction term of learning and motivation to transfer on the total effect of results (effect = -0.066). In sum, reaction, learning motivation and self-efficacy explain 18.0 per cent of the variance of learning. Taken together, reaction, learning motivation, self-efficacy and learning account for 23.8 per cent of the variance of behavior directly and/or indirectly. All of the variables, including behavior, explain 9.4 per cent of the variance of results (Figure 6-2).

## 6.6 Discussion

This research provides support for Kirkpatrick's model to expand into the hierarchy relationship of reaction, learning, and job behavior to results. The results of this study fully supported previous findings in the literature on training effectiveness, which were obtained partially in most studies (Alliger and Janak, 1989; Alliger et al., 1997; Leach and Liu, 2003; Kirkpatrick, 1996; Tan et al., 2003; Warr, Allan and Birdi, 1999). This result is consistent with Alliger et al.'s (1997) meta-analysis and supports Kirkpatrick's (1967) original suppositions on the hierarchical nature of the relationship among the four primary training criteria.

Additionally, the results showed a significant relationship between (1) self-efficacy and learning, and (2) motivation to learn and learning. These finding are consistent with the literature on self-efficacy and learning motivation.

First, self-efficacy had a positively significant relationship with learning, consistent with the training literature (e.g., Colquitt, LePine and Noe, 2000; Gist, Schwoerer and Rosen, 1989; Gist, Stevens and Bavetta, 1991; Martocchio, 1994; Simmering and Posey, 2009). The results of this study showed that trainees have more confidence on their ability to use newly acquired knowledge and skills from training can learn better. Therefore, trainees who believe in their ability to be experts and succeed in training may be more likely to consider and use training as an instrument for improving and developing their performance in the workplace to maximize learning.

Second, learning motivation had a positively significant relationship with learning. This finding was consistent with those of previous studies (Alliger and Janak, 1989; Chuang et al., 2005; Clement, 1982; Liao and Tai, 2006). It suggested that, for example, when organizations require employees to participate in training programs more effectively, they should enhance learning motivation among trainees to increase their learning. For that purpose, the workload should not be too excessive in order that organizations allow time for them to learn the new knowledge and skills from training. However, the finding, moderation of self-efficacy and learning motivation were not available in the relationship between reaction and learning.

With regard to the effects of the other factors, motivation to transfer was not a significant predictor of behavior. On the other hand, the moderating effect from motivation to transfer was found to be significantly negative in the relationship between learning and behavior. This result is in contrast to the expectation. Trainees who succeed in learning from training are found to

conduct less behavior change along with training contents when they have high motivation to transfer, compared with when having low motivation. In other words, those who have low motivation are more affected by the extent of learning while those having high motivation are relatively stable in changing behavior regardless of the extent of learning. A possible explanation for the result is as follows; the case organizations have unfavorable work environments such as the difference in machine and equipment that could not be captured by the related variables in the model. Subsequently, when those with higher motivation to transfer have more learning, they face more difficulties in transfer and they were less active in their behavioral change based on their learning, in comparison of those with lower motivation to transfer.

Another important finding was the significant relationship between social and organization support and behavior. This finding is consistent with previous research on supervisor and peer support, such as that by Bates et al. (2000), Cromwell and Kolb (2004), Facteau et al. (1995) and Holton et al. (1997). According to the literature, social and organization support had a high direct effect on behavior change, particularly support from supervisors, peers and the organization, in the forms of feedback, coaching, opportunities to apply, materials and socio-emotional benefits. Particularly, supervisors are required to reinforce learning on the job such as providing assistance for solving the problems by new knowledge and skills from training, setting criteria and discussion for applying new knowledge and skills on the job. Support from co-worker is expected through supporting the use of learning on the job and sharing work-related information or knowledge to trainees. The organizations should provide the efficient and flexible workspace for teaching knowledge and skills from training to other employees. Moreover, the findings of this study provide further evidence of the significant moderating effect of social support on the relationship between learning and behavior. The

results demonstrate that when trainees are successfully learning with high social support, they experience more behavioral change on the job after training. This would lead to more powerful transfer-enhancement in the workplace.

## 6.7 Conclusions

The results of this study expand our understanding of the progressive causal relationship of reaction, learning, and behavior to results. In addition, this study highlighted the direct relationship between (1) self-efficacy and learning, and (2) learning motivation and learning. Although the result of motivation to transfer as a moderating variable has negative effects on the relationship between learning and behavior, social and organizational support directly affects behavior change after training and moderates the relationship between learning and behavior. The results of this study confirm the influence of the individual and work environment characteristics on training outcomes and it has implications for enhancing training effectiveness. Furthermore, future research on training evaluation should consider the training design variables beyond the training course that may have interfered with the training outcomes.

# Chapter 7

## The Influence of Social and Organizational Support on Transfer of Training

This chapter focused on the specific dimensions of social support as the moderating variable influencing on the relationship between learning and transfer of training. This study focused three types of social support as the work environment characteristic including supervisor, co-worker or peer, and organizational support. This particular focus is mainly because social support factors have become increasingly the important indicator for transfer of training among researchers. This chapter is divided into seven sections. Section 7.1 is introduction and presents the objectives of this chapter. Section 7.2 presents the conceptual framework and the next section (section 7.3) also provides the review of previous studies and develops the hypotheses in this study. Section 7.4 provides the methodology of this study. Results and discussion will be provided in section 7.5 and 7.6. The last section, 7.7 is conclusion.

### 7.1 Introduction

Many organizations are seriously concerned about whether they have wasted training investments because not all of the knowledge, skills, and attitudes (KSAs) taught in training courses transfer back to the workplace and can be put to use (Baldwin and Ford, 1988). This means that, following costly training programs, employees may not improve their behavior and performance to meet the requirements of the organization. To accomplish organizational

tasks and improve employee performance, extended training programs including social and organizational support after training should be designed in such a way that acquired KSAs are transferred effectively to the workplace. Thus, researchers and training professionals have focused on the factors affecting the transfer of training to the workplace.

The review of Baldwin and Ford (1988) is a good starting point for an investigation of the relevant studies. They found three factors that affect transfer of training: training design, trainee characteristics, and work environment. Although terminologies have varied to some extent across studies, Baldwin and Ford's classification methods continue to be utilized by recent review articles (Blume, Ford, Baldwin, and Huang, 2010; Burke and Hutchins, 2007).

Work environment factors are considered important for understanding the transfer process (e.g., Baldwin and Ford, 1988; Blume et al., 2010; Cheng and Ho, 2001; Kirwan and Birchall, 2006; Pham, Segers, and Gijselaers, 2012; Rouiller and Goldstein, 1993; Tracey, Tannenbaum, and Kavanagh, 1995). Literature reviews reported inconsistent results among related studies. For instance, Cheng and Hampson (2008) noted that incoherent reasoning applied to such work environment variables as social support (e.g., supervisors, peers and subordinates) and opportunity to transfer. Cheng and Ho (2001) reviewed studies on the relationships between supports-in-organizations (including both social and organizational support in this study) and transfer outcomes and found conflicting results. Some empirical studies found that social support had an effect on transfer of training (e.g., Holton, Bates, and Ruona, 2000; Olsen, 1998; Pham et al., 2012; Xiao, 1996) while others found that a supportive environment did not have such an effect (e.g., Rouiller and Goldstein, 1993; Tziner, Haccoun, and Kadish, 1991; Van der Klink, Gielen, and Nauta, 2001).

Therefore, a study of transfer of training from a more specific work environment perspective is expected to better our understanding of its process. Specifically, we will analyze

the main effects of work environment variables as well as those of their interactions with learning outcome. Blume et al. (2010) found the main effects and compared the results for supervisor and peer support, transfer climate, and organizational constraints through a meta-analysis; however, the number of studies and samples was limited. In addition, they did not investigate the interactions with learning outcome.

Among others, social and organizational support factors have increasingly become the focus of attention within the research on transfer climate (Van den Bossche, Segers, and Jansen, 2010). Several researchers have recently examined the necessary role of supervisor and peer support in the transfer of training process (Chiaburu and Marinova, 2005; Hawley and Barnard, 2005; Lim and Morris, 2006; Nijman, Nijhof, Wognum, and Veldkamp,2006; Russ-Eft, 2002). Moreover, this paper proposes to investigate the effect of another work environment factor, organizational support, on the transfer of training process.

Most research on training effectiveness in Thailand, like the present study, has focused on Kirkpatrick's levels of training, specifically levels one (reaction) and two (learning). Consequently, Thai human resources development professionals continue to make decisions based solely on reaction and learning. Little research has investigated behavior change (level three) through transfer of training, especially which factors affect it. Without understanding and measuring the effects of these factors on transfer of training, it is not possible to fully understand why transfer of training is or is not successful.

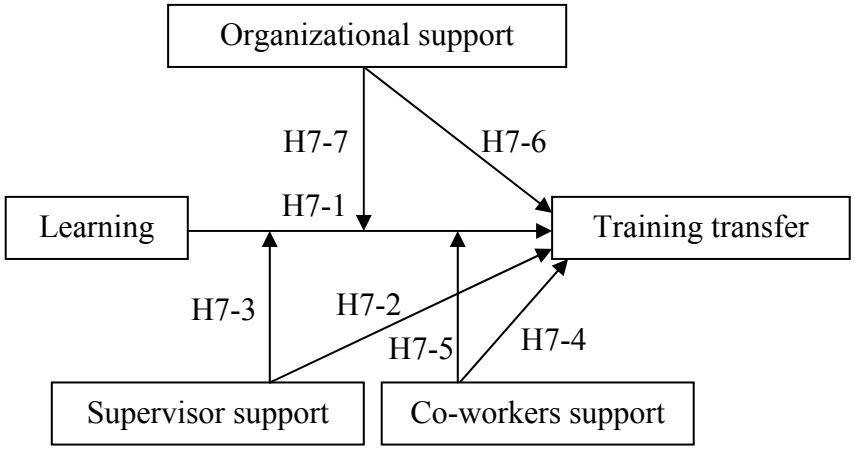
According to the arguments above, the main purpose of this study is to investigate the relationship between learning, especially knowledge retained and consequent transfer in use and effectiveness with a focus on the moderating influences of social (supervisor and co-worker) and organizational support. We pose the following research questions: How does trainees' learning, especially the level of knowledge retained, influence transfer of training?

How do work environment factors such as social and organizational support affect the relationship between learning and transfer?

## 7.2 Conceptual Framework

The conceptual framework for this study is shown in Figure 7-1. A focus of this study is testing transfer of training in terms of two of Kirkpatrick's (1967) levels of evaluation: learning (specifically knowledge retained) and behavior change (including both use and effectiveness of training transfer). Furthermore, we aimed to investigate social support—that is, supervisor and co-worker—and organizational support as moderators in the main analysis model of the relationship between learning and training transfer. The specific hypotheses for each relationship are illustrated in Figure 7-1.

**Figure 7-1:** Conceptual framework




## 7.3 Literature Review and Development of Hypotheses

### 7.3.1 Transfer of Training

Kirkpatrick's four-level evaluation model has been supported for several decades as the primary conceptual framework for evaluating training effectiveness. In particular, the

distinction between learning (level two) and behavior (level three) has drawn increased attention to the importance of the learning transfer process in making training truly effective (Bates and Coyne, 2005).This study evaluated the effectiveness of the transfer of training in terms of Kirkpatrick's (1967) two levels of evaluation: learning and behavior. Level 2, learning, refers to the KSAs acquired by trainees. Evaluation of learning aims at understanding trainees' comprehension of instruction, principles, ideas, knowledge, and skills from training. This level of evaluation allows trainees to demonstrate their understanding of specific knowledge and/or skills within the learning program (Kirkpatrick, 1994). Level 3, behavior change or transfer, refers to the extent to which a change in behavior has occurred because the trainees attended the program, andit is measured (assessed) in the workplace. This level attempts to determine whether trainees use their new KSAs learned when returning to the work environment. If learned KSAs are not transferred to the job, the training effort cannot have an impact on employee or organizational effectiveness.

It is generally agreed that behavioral change will not occur without learning (Kirkpatrick, 1994). Velada, Caetano, Michel, Lyons, and Kavanagh (2007) found that when trainees retain training content, they are more likely to perceive that they have transferred the training to the work context. Liebermann and Hoffmann (2008) also found learning to have a direct impact on transfer. According to Expectancy Theory (Vroom, 1964), if learners' individual motives are believed to lead to strengthened performance, they will be more motivated. Therefore, more successful learners feel that they can work better through utilizing acquired knowledge for their jobs. Based on the theoretical and literature reviews above, we hypothesized that:

**Hypothesis 7-1:** Learning from training has a positive relationship with transfer of training.

### 7.3.2 Work Environment Characteristics: Social Support

Groups of variables affecting transfer of training were proposed by several review studies (e.g., Baldwin and Ford (1988), Cheng and Hampson (2008), Cheng and Ho (2001), Colquitt, LePine, and Noe (2000), and Holton et al. (2000). More specifically, trainees' perceptions of the work environment have been found to influence transfer of new KSAs to the job (e.g., Chiaburu and Marinova, 2005; Ford, Quinones, Sego, and Sorra,1992; Hawley and Barnard, 2005; Lim and Morris, 2006; Nijman et al., 2006; Rouiller and Goldstein, 1993; Traceyet al., 1995; Tziner and Falbe, 1993; Russ-Eft, 2002). However, as Richmann-Hirsch (2001) pointed out, previous studies examining the effectiveness of training transfer did not explore the potential moderating effect of work environment.

Work environment characteristics have often been referred to as the "transfer climate," or as the factors that trainees perceive as encouraging or discouraging their use of KSAs learned in training and in the workplace (Cromwell and Kolb, 2004). Clarke (2002) indicated that, among others, social support is an important factor in the transfer climate influencing the use of training on the workplace. Many previous studies have been based on the perspective of support providers such as supervisors and co-workers, as discussed in detail below. Thus, this study investigated the effect of these two types of social support (supervisor and co-worker or peer support).

#### *1) Supervisor Support*

Supervisor support has been defined as the extent to which supervisors reinforce and support the use of learning on the job (Bates,Holton, and Seyler,1996). Examples of supervisor support include setting learning goals, helping, and offering positive feedback. Ithas been supported asone of the work environment variables that affect the transfer process

(e.g., Awoniyi, Griego, and Morgan,2002; Baldwin and Ford, 1988; Clarke, 2002; Cromwell and Kolb, 2004; Elangovan and Karakowsky, 1999; Gregoire, Propp, and Poertner,1998; Gumuseli and Ergin, 2002; Quinones, Ford, Sego, and Smith, 1995; Richman-Hirsch, 2001; Russ-Eft, 2002; Salas and Cannon-Bowers, 2001; Smith-Jentsch, Salas, and Brannick, 2001; Taylor, 1992).

According to Huczynski and Lewis (1980), the majority of trainees indicated that supervisor support was a significant factor in transferring the skills they learned to the job. Campbell and Cheek (1989) maintained that, without supervisory support, the transfer of newly acquired behaviors to the worksite would be extremely difficult at best. Gregoire et al. (1998) also found that the supervisor's role in "providing tangible help for workers to attend training and attempt new behaviors upon their return" (p.12) was associated with a perceived increase in transfer of training. Frequent interaction between employees and their immediate supervisor (Zhang, Tsui, Song, Li, and Jia,2008) and the potential benefit in transferring tacit knowledge to employees (Collis and Winnips, 2002) are possible advantages derived from supervisor support, and may ensure effective utilization of the acquired knowledge and skill in the workplace. The process can be realized through the perception of the usefulness of supervisor support and training transfer.

As introduced above, prior research confirmed that supervisor support influences transfer of training. Yet, like other work environmentvariables, the potential moderating effect of supervisor support on the relationship between learning and training transfer has not been explored. Here, we would like to refer to Richmann-Hirsch's (2001) study, although that study did not analyze exactly the moderation above. Richmann-Hirsch indicated that perceptions of work environment moderated the effectiveness of (but not the learning) post-training interventions on transfer of training. The work environment construct she used consisted of

social and organizational support aspects, while post-training interventions consisted of goal-setting and self-management activities. According to Richmann-Hirsch's argument, trainees engaged in goal-setting are more affected by work environment than those engaged in self-management, because the former are likely to have more motivation than the latter. We will employ this reasoning to our investigation of the moderating effect of supervisor support on the relation between learning and training transfer.

Hence, we assume that trainees who learned more from a training program will display more behavior change if they received stronger supervisor support. Supervisor support will still positively affect behavior among trainees who learned less from the training program, but to a lesser degree. Therefore, we hypothesized that:

**Hypothesis 7-2:** Supervisor support has a positive relationship with transfer of training.

**Hypothesis 7-3:** Supervisor support will moderate the relationship between learning and transfer of training.

***2) Co-worker Support***

Empirical research on the importance of co-worker support to transfer of training has increased since the mid-1990s (e.g., Bates, Holton, Seyler, and Carvalho,2000; Facteau, Dobbins, Russell, Ladd, and Kudisch, 1995; Holton, Bates, Seyler, and Carvalho1997). Holton et al. (1997) and Russ-Eft (2002) define co-worker support (in their term, "peers support") in transfer climate as the extent to which co-workers support the use of learning on the job. This support could include setting learning goals, giving assistance, or offering positive feedback (Hawley and Barnard, 2005).

Co-worker support has been reported by several researchers as a factor that facilitates transfer. For instance, Holton et al. (1997) indicated that it was one of five factors with the

highest correlation with transfer of training. Bates et al. (2000) found that co-worker support was a significant predictor of learning transfer. Cromwell and Kolb (2004) also found that support of a trainee's peers is effective in the transfer process.

The knowledge transferred from peers may not be as accurate as other sources of learning (Mathis and Jackson, 2000). In addition, peers might be reluctant to share their knowledge. However, the possibility of asking for help at the time a problem occurs and its convenience (Twidale, 2005) make co-worker support potentially beneficial. Van der Klink et al. (2001) discuss the importance of co-worker support due to the increased use of self-directed teams in organizations. They suggest that, because of this increase, it is possible that team members in the workplace influence trainees' transfer more than supervisors do.

Although prior research confirmed the direct effect of co-worker support on training transfer, no studies investigated co-worker support as a moderating influence on training effectiveness by using learning and transfer. As with the case of supervisor support, based on our own justification and application of Richmann-Hirsch's (2001) design in a similar context, we assume that trainees who learned more from training will exhibit stronger transfer of training if they received stronger co-worker support. Co-worker support will still positively affect transferby trainees who learned less from the training program, but to a lesser degree. Therefore, we hypothesized that:

**Hypothesis 7-4:** Co-worker support has a positive relationship to transfer of training.

**Hypothesis 7-5:** Co-worker support will moderate the relationship between learning and transfer of training.

### 7.3.3 Work Environment Characteristics: Organizational Support

Previous studies have remained ambiguous with regard to the influence of organizational support on training transfer, such that when employees perceive the organizational climate as supportive, they are more likely to apply their new knowledge and skills to the workplace (Baldwin and Ford, 1988; Rouiller and Goldstein, 1993; Tracey et al., 1995). Organizational support theory argues that employees pay attention to treatment offered by the organization in an effort to determine the degree of their contributions to the organization. An important component of this argument is the notion that employees believe that treatment provided to them by the organization is representative of the organization's general orientation towards them (Eisenberger, Huntington, Hutchison, and Sowa, 1986). Thus, organizations provide material and socio-emotional benefits to employees in exchange for their commitment and work effort on behalf of the organization.

In terms of the moderating effect of organizational support on the relation between learning and training transfer, as with supervisor and co-worker support, we would like to rely onour own justification and application of Richmann-Hirsch (2001). Accordingly, we can imply that trainees who learned more from training are more likely to be affected by their organizational support level in their behavioral change. Therefore, our focus here is on organizational support as an important moderating variable on the relationship between learning and training transfer. We propose that:

**Hypothesis 7-6:** Organizational support has a positive relationship to transfer of training.

**Hypothesis 7-7:** Organizational support will moderate the relationship between learning and transfer of training.

As an extension of the main study, we provide an in-depth investigation of two types of work: blue-collar and white-collar. Because the training participants were of several occupations from different situations and organizations, we could not discount the possible confounding effect of such diversity ontraining transfer. Blue-collar work is typically considered to be mainly physical and routine, while any task that is either relatively more intellectual or creative can be defined as white-collar work (Hopp, Iravani, and Liu, 2009). Consequently, this study defines blue-collar work as technical and production-related work, and white-collar work as engineering, managerial, and teaching. The difference is significant, for example, in the source of the appreciation for the work done. Blue-collar workers evidently are highly self-aware of how well they do their jobs, whereas white-collar workers need outside confirmation of job worth. In this aspect, the former seem to be less influenced by social and organizational supports both in the main and moderation effects. Therefore, one might also expect that blue- and white-collar workers transfer learned knowledge and skills to the workplace differently because of their differing social and organizational support.

**In-Depth Research Question:** How do the social and organizational support moderate the relationship between learning and transfer of training differently in white- and blue-collar workers?

## 7.4 Methodology

### 7.4.1 Participants

The questionnaire survey was implemented during November and December of 2012 through face-to-face interviews with 228 persons by 10 research assistants. All survey participants passed the skill certification exam after training in the sub-program; 217 provided valid responses, yielding a response rate of 59.78%.

Participants could attend multiple levels of a number of subjects of training. The subjects attended by trainees were electrical maintenance (10.2%), mechanical maintenance (9.5%) of both pneumatic circuits and apparatus device assembling and hydraulic system adjustment (8.6%), metal press work/stamping (7.9%) of both plastic injection and electronics device assembly (6.8%), ferrous casting (6.3%) of both sequence control and die/mold finishing (6.1%), milling with numerical control (5.2%), lathe with numerical control (4.8%), machining (lathe, milling) (4.3%), mechanical drawing by handwriting and mechanical assembly finishing (3.2%), and mechanical drawing by computer-aided design (CAD) (2.3%). Among the sample, 98.6% were male. Regarding their age, 46.8% were between 31 and 40 years old, 47.7% were between 21 and 30 years old, and 11.5% were above 40 years old. As for education, 53.0% graduated from university, and 35.4% graduated from vocation school. Of the respondents, 55.5% worked for automotive assembly and automotive parts manufacturers while others were from universities and training intuitions such as vocational colleges; 55.3% held staff-level positions, 35.0% held supervisor-level positions, and 7% held manager-level or higher positions. A total of 85 trainees were engaged in white-collar work and 132 trainees in blue-collar work.

### 7.4.2 Measures

Among variables in this study, the measures of Kirkpatrick's (1976, 1994) model for learning and behavior were those as explained in Chapter 5. This chapter identified social support includes supervisor and co-worker support. Supervisor support has the critical task of providing reinforcement for knowledge retained on the job. Examples of supervisor support items are: "my supervisor provides assistance when I have a problem trying out knowledge and skills" and "my supervisor discusses how to apply knowledge and skills to job situation." Co-worker support focuses predominantly on supporting the use of knowledge retained on the

job. Examples of co-worker support items are; “my co-worker cares about my applying new knowledge and skills on the job” and “my co-worker frequently shares work-related information/knowledge with me.” Organizational support focuses on an organization’s provision of material goods such as transportation, money, or physical assistance to employees for the purpose of supporting the transfer of training to the workplace as well as the organization’s provision of training opportunities and training information for workers. Examples of organizational support items are: “my organization has a strategy plan and interest in personal and professional development of employees” and “my organization has inefficient and inflexible workspace for teaching knowledge and skills from training to other employees.” The social and organizational support measures consisted of 25 items adopted from previous studies, that are, supervisor support consisted of 12 items, co-worker support consisted of 6 items, and organizational support consisted of 7 items (e.g., Elwood, Holton, Bates, and Wendy 2000; Kupritz, 2002; Xiao, 1996).

Responses for all measures were made on a five-point Likert scale (1 = disagree strongly to 5 = agree strongly). To ensure the measures were appropriate, we performed a confirmatory factor analysis (CFA) via AMOS version 21 using maximum likelihood (ML) estimation. The results from the CFA showed that all factor loadings and path coefficients were statistically insignificant, with all factor loadings above 0.50 (Hair, Anderson, Tatham, and Black,1998). The results revealed a good fit between model and data and thus support the unidimensionality of the scale. The construct reliability of all measures (learning: .893, transfer of training: .808, supervisor support: .783, co-worker support: .791, organizational support: .663) were above 0.6, and the convergent validity of all measures (learning: .583, transfer of training: .639, supervisor support: .556, co-worker support: .695, organizational support: .574) was above 0.5 (Zainudin, 2012). In sum, these results support the factorial

validity and reliability of all measures. Therefore, we conclude that the items reliably measure the defined constructs and variables. Since the measures of this study were self-reported, there is some concern about common-method variance (Podsakoff, Mackenzie, Lee, and Podsakoff,2003; Podsakoff and Organ, 1986). Hence, Harman's one-factor test was implemented (Podsakoff and Organ, 1986). An un-rotated factor analysis yielded 11 factors, among which the first factor accounted for only 20.38% of the variance.

*Analyses.* First, descriptive statistics were computed for all variables. Second, internal consistency reliability estimates and interscale correlations by Pearson product-moment were calculated. Finally, we used hierarchical regression procedures to support our hypotheses. These analyses were performed with SPSS 19.0.

## 7.5 Results

Means, standard deviations, and correlations among all measurements are reported in Table 7-1. Hierarchical regression analyses were performed to examine the effects of each type of social support as a moderating variable on the relationship between learning and transfer of training. Control variables, age, education background, and position were entered first, learning and each type of social support second, and interaction terms last. Collectively, only educational background as a control variable accounted for significant variance in transfer of training (see Table 7-2). Regression results in Table 7-2 illustrate that the effect of knowledge retained on transfer of training was positive and statistically significant,as predicted by Hypothesis 7-1.

**Table 7-1:** Means, standard deviations, and intercorrelations of variables *(N = 217)*

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Age | 34.250 | 6.066 | | | | | | | |
| 2. Education background | 14.673 | 2.219 | .283** | | | | | | |
| 3. Position | - | - | -.330** | -.325** | | | | | |
| 4. Knowledge retained | 4.100 | 0.319 | .086 | .036 | -.014 | | | | |
| 5. Supervisor support | 4.066 | 0.294 | .021 | .041 | .053 | .253** | | | |
| 6. Co-workers support | 3.962 | 0.374 | .040 | .027 | -.009 | .136* | .244** | | |
| 7. Organizational support | 4.020 | 0.388 | .222** | -.025 | .090 | .150* | .296** | .203** | |
| 8. Training transfer | 4.070 | 0.341 | -.001 | .181** | -.079 | .344** | .198** | .165* | .025 |

*$p < 0.05$, **$p < 0.01$

*Note:* Education background is the number of years of education.

We used Model 1 to test Hypotheses 7-2 and 7-3, which predicted the direct effect from supervisor support on transfer of training and its moderating effect on the relationship between learning and transfer of training. The results found that supervisor support was not a significant predictor of transfer of training and did not moderate the relationship between learning and transfer. Thus, Hypotheses 7-2 and 7-3 were not supported (see step 3 of Model 1 in Table 7-2).

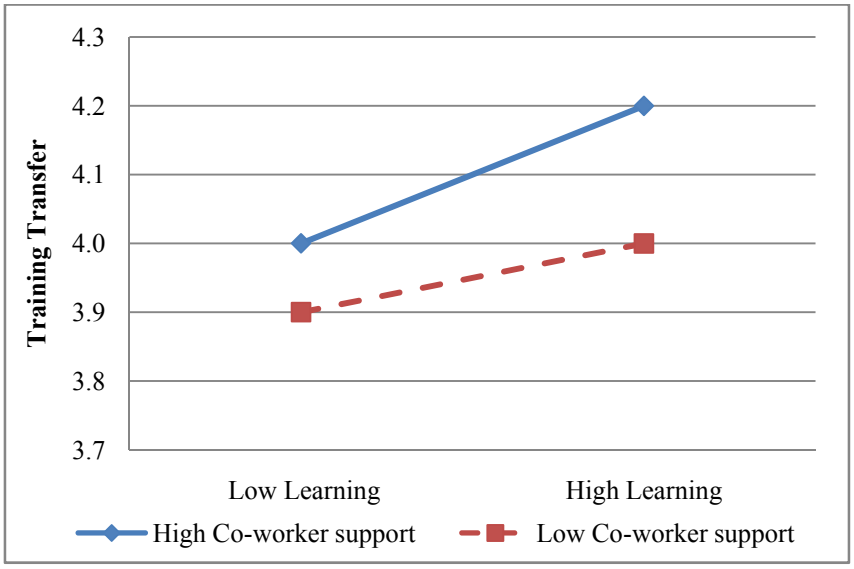
Next, we found that co-worker support had a significant and positive effect on transfer of training (see step 3 in Model 2). Therefore, Hypothesis 7-4 was supported. Furthermore, the results of the moderated regression analyses in step 3 of Model 2 also indicated that co-worker support had a significant and positive effect on the relationship between learning and transfer (see Table 7-2). These interactive effects are displayed in Figure 7-2. The slopes (betas) for high and low co-worker support cases were found to be different.Thus, the result supported Hypothesis 7-5.

**Table 7-2:** Results of hierarchical regression analysis, examining the moderating effect of social and organizational support on the relationship between learning and transfer

| Predictors | Training transfer (N = 217) | | |
|---|---|---|---|
| | Step 1 | Step 2 | Step 3 |
| ***Model 1*** | | | |
| Age | -.067 | -.098 | -.099 |
| Educational Background | .187* | .175* | .174* |
| Position | -.041 | -.057 | -.057 |
| Learning | | .317*** | .316*** |
| Supervisor support | | .116 | .116 |
| Learning × Supervisor support | | | .004 |
| $R^2$ | .037 | .168 | .168 |
| Adjusted $R^2$ | .024 | .149 | .144 |
| $R^2$change | .037* | .131*** | .000 |
| *F* change | 2.748* | 16.615*** | .004 |
| ***Model 2*** | | | |
| Age | -.067 | -.101 | -.103 |
| Educational Background | .187* | .179** | .149* |
| Position | -.041 | -.049 | -.074 |
| Learning | | .330*** | .290*** |
| Co-worker support | | .119 | .144* |
| Learning × Co-worker support | | | .254*** |
| $R^2$ | .037 | .170 | .231 |
| Adjusted $R^2$ | .024 | .150 | .209 |
| $R^2$change | .037* | .132*** | .062*** |
| *F* change | 2.748* | 16.808*** | 16.833*** |
| ***Model 3*** | | | |
| Age | -.067 | -.099 | -.098 |
| Educational Background | .187* | .181** | .175* |
| Position | -.041 | -.048 | -.049 |
| Learning | | .345*** | .336*** |
| Organizational support | | .004 | -.006 |
| Learning × Organizational support | | | .047 |
| $R^2$ | .037 | .156 | .158 |
| Adjusted $R^2$ | .024 | .136 | .134 |
| $R^2$change | .037* | .119*** | .002 |
| *F* change | 2.748* | 14.811*** | .477 |

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

**Figure 7-2:** Moderating effect of co-worker support on the relationship between learning and transfer




Finally, Hypotheses 7-6 (that organizational support has a positive relationship with transfer of training) and 7-7 (that organizational support will moderate the relationship between learning and transfer) were not supported by our results (see Model 3 in Table 7-2).

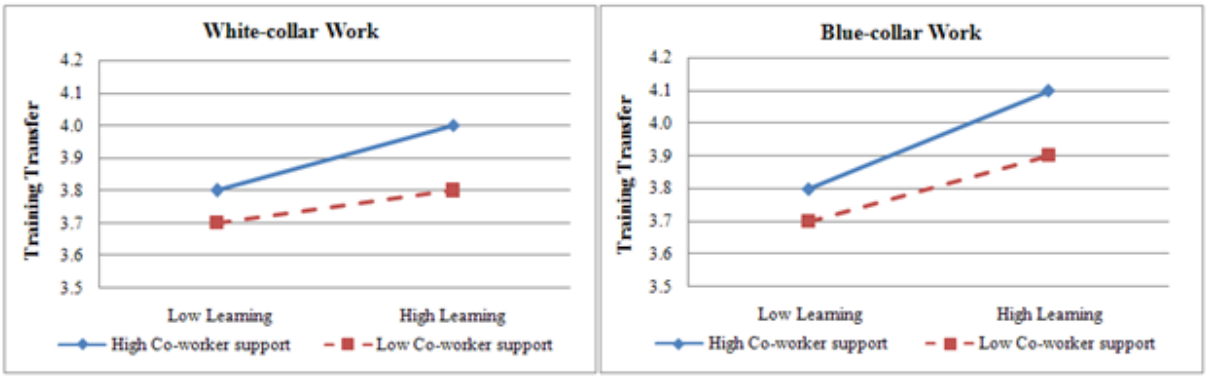
The results of an in-depth investigation by hierarchical regression analyses showed similar results with aggregate analysis. For both blue- and white-collar workers, learning was positively predictive of training transfer. Co-worker support as a moderating variable had a positive effect on the relationship between learning and transfer (see Model 2 in Table 7-3 and Figure 7-3).

**Table 7-3:** Results of hierarchical regression analysis, examining the moderating effect of social and organizational support on the relationship between learning and transfer by two types of work

| Predictors | Training transfer | | | | | |
|---|---|---|---|---|---|---|
| | White-collar Work (N = 85) | | | Blue-collar Work (N = 132) | | |
| | Step 1 | Step 2 | Step 3 | Step 1 | Step 2 | Step 3 |
| ***Model 1*** | | | | | | |
| Age | -.110 | -.175 | -.176 | -.014 | -.005 | -.013 |
| Educational Background | .152 | .180 | .182 | .247* | .208* | .213* |
| Position | -.124 | -.131 | -.127 | -.086 | .073 | .071 |
| Learning | | .329** | .332** | | .321*** | .304*** |
| Supervisor support | | .177 | .174 | | .027 | .016 |
| Learning × Supervisor support | | | -.020 | | | .072 |
| $R^2$ | .043 | .222 | .222 | .049 | .154 | .159 |
| Adjusted $R^2$ | .008 | .173 | .163 | .027 | .121 | .119 |
| $R^2$change | .043 | .179*** | .000 | .049 | .105*** | .005 |
| *F* change | 1.221 | 9.081*** | 0.037 | 2.206 | 7.829*** | 0.695 |
| ***Model 2*** | | | | | | |
| Age | -.110 | -.208 | -.186 | -.014 | -.018 | -.050 |
| Educational Background | .152 | .213 | .199 | .247* | .207* | .185* |
| Position | -.124 | -.127 | -.151 | -.086 | .048 | .033 |
| Learning | | .402*** | .371*** | | .310*** | .250*** |
| Co-worker support | | .011 | .054 | | .178* | .181* |
| Learning × Co-worker support | | | .208* | | | .289*** |
| $R^2$ | .043 | .197 | .237 | .049 | .184 | .263 |
| Adjusted $R^2$ | .008 | .146 | .178 | .027 | .152 | .227 |
| $R^2$change | .043 | .153*** | .040* | .049 | .135*** | .078*** |
| *F* change | 1.221 | 7.541*** | 4.079* | 2.206 | 10.440*** | 13.307*** |
| ***Model 3*** | | | | | | |
| Age | -.110 | -.219 | -.219 | -.014 | .017 | .021 |
| Educational Background | .152 | .209 | .209 | .247* | .206* | .197* |
| Position | -.124 | -.147 | -.148 | -.086 | .080 | .088 |
| Learning | | .393*** | .392*** | | .331*** | .302*** |
| Organizational support | | .061 | .060 | | -.052 | -.081 |
| Learning × Organizationalsupport | | | .005 | | | .112 |
| $R^2$ | .043 | .200 | .200 | .049 | .156 | .166 |
| Adjusted $R^2$ | .008 | .149 | .138 | .027 | .122 | .126 |
| $R^2$change | .043 | .158*** | .000 | .049 | .107*** | .010 |
| *F* change | 1.221 | 7.723*** | 0.002 | 2.206 | 7.973*** | 1.568 |

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

**Figure 7-3:** Moderating effect of coworker support on the relationship between learning and transfer by white-collar and blue-collar work




## 7.6 Discussion

First, the study found that learning from training had a positive relationship with training transfer. This is consistent with prior research on the evaluation of training transfer (Baldwin and Ford, 1988; Lim and Johnson, 2002; Liebermann and Hoffmann, 2008; Maister, 2008; Velada et al., 2007) and supports Kirkpatrick's (1967) original suppositions that behavioral change will not occur without learning.

Second,only co-worker support was significantly and positively related to transfer of training. This finding is consistent with prior research on the relative importance of co-worker or peer support in transfer of training (e.g., Bates et al., 2000; Facteau et al., 1995; Holton et al., 1997). Additionally, a significant moderating effect of co-worker support was found on the relationship between learning and transfer. Our results demonstrate that when trainees learning successfully and had high co-worker support, they displayed more behavioral change on the job. In recent years, empirical research on the importance of co-worker support regarding transfer of training has increased with further evidence provided by the findings of many studies. Co-worker support is important because of organizations' increased use of self-

directed teams. Van der Klink et al. (2001) suggest that, because of this increase, it is possible that team members in the workplace might influence trainees' transfer more than supervisors do. We may expect this result, because tasks in automotive industry firms are likely to be team-based and relatively discretionary on a daily basis.

However, no significant relationships were found between (1) supervisor support and transfer of training or (2) organizational support and transfer of training. These results are in contrast with previous research (Baldwin and Ford, 1988; Clarke, 2002; Cromwell and Kolb, 2004; Elangovan and Karakowsky, 1999; Gregoire et al., 1998; Quinones et al., 1995; Richman-Hirsch, 2001; Russ-Eft, 2002; Salas and Cannon-Bowers, 2001; Smith-Jentsch et al., 2001; Taylor, 1992). Furthermore, supervisor and organizational support did not moderate the relationship between learning and transfer. Indeed, some studies found supervisor support was unrelated to skill transfer (Facteau et al., 1995; Russell, Terborg, and Powers, 1985; Van der Klink et al., 2001). Holton, Chen, and Naquin (2003) contended that the cultural variations across organizations may disturb the impact of different types of supports on transfer outcomes.

### 7.7 Conclusions

This study contributes to our understanding of transfer of training, especially by investigating the moderating effect of social and organizational support. Results supported a hypothesized effect of learning and co-worker support on transfer; higher levels of knowledge retained and co-worker support increased training transfer. These results suggest that, in order to enhance training transfer, organizations should focus more on creating environments that enhance co-workers' supports specifically than on supervisor and organizational support, at least in the short term. However, for the longer term, organizations must improve the quality of other types of social support as well to exploit the opportunities for transfer of training more effectively.

# Chapter 8

# Conclusions and Policy Implications

## 8.1 Summary of Main Findings

This dissertation focuses on the effectiveness of skill certification system for automotive industry in Thailand. The case of the present study was one of the sub-programs under AHRDP. Specifically, this study tried to evaluate the effectiveness of the skill training and certification program by using Kirkpatrick's model and investigated the influence of moderator variables on training effectiveness. For one thing, that is because the original model was not fully investigated in a progressive causation of four levels. Thus this study investigated the progressive causal relationship of reaction, learning, and behavior to results. Furthermore, this study investigated individual and work environment characteristic variables, which are: learning motivation, self-efficacy, motivation to transfer and social support, as moderators of the relationship between training and its outcome. Without considering the role of trainees' individual and work environment characteristics as influencing training effectiveness, it is not possible to fully understand why training is effective or not. Kirkpatrick's model doesn't explicitly incorporate these factors.

The main objective of the dissertation is to analyze effectiveness of skill certification system for automotive industry in Thailand by using Kirkpatrick's model.

The specific objectives of this dissertation are:

1) To investigate Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes.
2) To investigate four levels of Kirkpatrick's model with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, social and organizational support.
3) To investigate the relationship between learning and behavior from training with a focus on moderating influences of social (supervisor and co-worker) and organizational support.

To answer these research questions, the main empirical evidence comprises three chapters, whose aim is to investigate training effectiveness of skill certification system for automotive industry in Thailand. First, Chapter 5 analyzed Kirkpatrick's four-level hierarchy of training evaluation, focusing specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes. Chapter 6 investigated four levels of Kirkpatrick's model with a focus on the moderating influences of individual and work environment characteristic variables, which are learning motivation, self-efficacy, motivation to transfer, and social support. Chapter 7 is testing the training transfer in terms of Kirkpatrick's two levels of evaluation: learning and behavior and investigating social and organizational support, that is, supervisor, co-worker, and organizational support as moderators into the main analysis model on the relationship between learning and behavior. As a consequence of the moderation effects, this chapter also provides an in-depth investigation on the role of social and organizational support as moderators into the training transfer by two groups of work that blue-collar and white-collar work.

Based on the reviews of training effectiveness, to analyze the relationship among four levels of Kirkpatrick's model, the research framework has been developed and empirically tested with Structural Equation Model (SEM) for analyzed the data in Chapter 5, which enables to identify the relationship among the variables all at once. As SEM has not been utilized in related studies, the analysis will be a new challenge in methodology. Moreover, Chapter 6 and 7 analyzed data by path analysis and the hierarchical regression analysis for assessing the influence of the moderating variables on independent-dependent relationships.

This study collected data by using a field survey. The questionnaire survey was implemented during November and December of 2012 through face-to-face interviews with 228 persons by 10 research assistants. All survey participants passed the skill certification exam after training in the sub-program; 228 provided valid responses, yielding a response rate of 62.8% for analyzing in Chapter 5, 6, and 7. Based on the analysis of Chapter 5, 6, and 7 for answering the research questions, the main empirical findings and conclusions of this dissertation are summarized in Table 8-1 and further discussed below.

**Table 8-1:** Summary of Main Analysis Findings

| Hypotheses | Conclusions |
|---|---|
| **Chapter 5: Testing Kirkpatrick's Four-Level Hierarchy of Training Evaluation** | |
| Hypothesis 5-1: There will be a hierarchy relationship of reaction, learning, and job behavior to results. | Supported |
| Hypothesis 5-1A: Combined trainee reactions will be positively related to learning. | Supported |
| Hypothesis 5-1B: Trainee affective reactions will be positively related to learning. | Not Supported |

| Hypotheses | Conclusions |
|---|---|
| Hypothesis 5-1C: Trainee utility reactions will be positively related to learning. | Supported |
| Hypothesis 5-1D Learning will be positively related to behavior. | Supported |
| Hypothesis 5-1E: Behavior will be positively related to results. | Supported |
| **Chapter 6: Effects of Individual and Work Environment Characteristics on Training Effectiveness** | |
| Hypothesis 6-1: Trainee reaction will be positively related to learning. | Supported |
| Hypothesis 6-2: Learning from training has a positive relationship with behavior. | Supported |
| Hypothesis 6-3: Behavior will be positively related to results. | Supported |
| Hypothesis 6-4: Learning motivation will be positively related to learning. | Supported |
| Hypothesis 6-5: Learning motivation will moderate the relationship between reaction and learning. | Not Supported |
| Hypothesis 6-6: Self-efficacy will be positively related to learning. | Supported |
| Hypothesis 6-7: Self-efficacy will moderate the relationship between reactions and learning. | Not Supported |
| Hypothesis 6-8: Motivation to transfer will be positively related to behavior. | Not Supported |
| Hypothesis 6-9: Motivation to transfer will moderate the relationship between learning and behavior. | Supported |
| Hypothesis 6-10: Social and organizational support will be positively | Supported |

| Hypotheses | Conclusions |
|---|---|
| related to behavior. | |
| Hypothesis 6-11: Social and organizational support will moderate the relationship between learning and behavior. | Supported |
| **Chapter 7: The Influence of Social and Organizational Support on Transfer of Training** | |
| Hypothesis 7-1: Learning from training has a positive relationship with transfer of training. | Supported |
| Hypothesis 7-2: Supervisor support has a positive relationship with transfer of training. | Not Supported |
| Hypothesis 7-3: Supervisor support will moderate the relationship between learning and transfer of training. | Not Supported |
| Hypothesis 7-4: Co-worker support has a positive relationship to transfer of training. | Supported |
| Hypothesis 7-5: Co-worker support will moderate the relationship between learning and transfer of training. | Supported |
| Hypothesis 7-6: Organizational support has a positive relationship to transfer of training. | Not Supported |
| Hypothesis 7-7: Organizational support will moderate the relationship between learning and transfer of training. | Not Supported |

Chapter 5 investigated progressive causal relationship of Kirkpatrick's model from reaction, learning, behavior, to results and focused specifically on the type of reaction criteria, including affective and utility reactions, in predicting training outcomes. This study makes two specific findings. First, it shows the progressive causal relationship of Kirkpatrick's model was proved excluding the one between affective reaction and learning.

Second, two kinds of reactions, affective and utility reactions, were hypothesized to impact learning. The results of the present study underlined that trainee utility reactions had a significant relationship to learning.

Chapter 6 integrated the individual and work environment characteristics on four-levels of Kirkpatrick's model. We adopted four variables concerned learning motivation, self-efficacy, motivation to transfer, and social support. Not merely their direct effects on training outcomes, we also investigate their moderation on the relationships between reaction (L1) and learning (L2), and behavior (L3).The results found that the effects of learning motivation, self-efficacy, motivation to transfer and social support as moderators were found in some of the relationships between training and its outcome. Specifically, the relationship between reaction and learning was not moderated by learning motivation and self-efficacy. However, the relationship between learning and behavior was moderated by motivation to transfer and social support. This result for the moderation by motivation to transfer was in contrast to the expectation, because the coefficient of the interaction variable with learning was negative.

In sum, the results of this chapter expand our understanding of the progressive causal relationship of reaction, learning, and behavior to results. In particular, this finding highlighted the direct relationship between (1) self-efficacy and learning, and (2) learning motivation and learning. Although the result of motivation to transfer as a moderating variable has negative effects on the relationship between learning and behavior, social support directly affects

behavior change after training and moderates the relationship between learning and behavior. The results of this chapter confirm the influence of the individual and work environment characteristics on training outcomes and it has implications for enhancing training effectiveness. In addition, hierarchical linear modeling and related assessment the individual and work environment characteristics should be quite useful in addressing the challenges of multilevel research on training effectiveness.

Chapter 7 investigated social and organizational support as the work environment characteristic as the moderating variable influencing on the relationship between learning and behavior. Results supported a hypothesized effect of co-worker support was significant positively with training transfer and moderating the relationship between learning and transfer. However, the results found that supervisor and organizational support were not a significant predictor of training transfer and did not moderate the relationship between learning and transfer.

This chapter also provides an in-depth investigation on the role of social and organizational support as moderators into the training transfer by two groups of work, that is, blue-collar and white-collar work. The results of an in-depth investigation by hierarchical regression analyses showed similar results with aggregate analysis. Both of blue-collar and white-collar work found that learning was positively predictive of training transfer. A co-worker support as a moderating variable has a positive effect on the relationship between learning and transfer

## 8.2 Implications

The findings of this dissertation are expected to provide a useful contribution to academic research and HRD professionals in Thai automotive industry (as implementers). The

evaluations can be useful to improve the program and suggest the appropriate HRD policies and practices for organizations in the industry. This study expands our understanding of the progressive causal relationship of reaction, learning, and behavior to results. In particular, this study contributes to our understanding of individual and work environment characteristic variables, which are: learning motivation, self-efficacy, motivation to transfer and social support, as moderators of the relationship between training and its outcome. In this regard, this study can provide useful knowledge of training effectiveness and the important criteria for training evaluation to researchers and implementers.

### 8.2.1 Contribution to Academic Research

The results of this study have several implications for future practice in the field of human resource development. In this study, the success of Kirkpatrick's four-level model may provide some beneficial information that increases the clarity of which training criteria should be selected and how to adequately measure them. Based on analytical results and interpretations, we can understand the progressive causal relationship of reaction, learning, and job behavior to results. Additionally, we can understand how individual and work environment characteristic variables, including learning motivation, self-efficacy, motivation to transfer and social support, moderate the relationship between training and its outcome. The results of this study confirm the influence of the individual and work environment characteristics on the training outcomes and it has implications for enhancing training effectiveness.

Based on the results of this study, we found direct relationships between (1) self-efficacy and learning, and (2) motivation to learn and learning. Furthermore, social support was positively related to behavior but motivation to transfer was not a significant predictor of behavior. By considering the moderating effect of learning motivation, self-efficacy, motivation

to transfer and social support as predictors of some of training outcomes and moderators of the relationship between the same training outcomes. Specifically, the relationship between reaction and learning was not moderated by learning motivation and self-efficacy. However, the relationship between learning and behavior was moderated by motivation to transfer and social support.

Furthermore, this study highlights the specific dimension of social support including supervisor, co-worker or peer, and organizational support as the moderating variable on the relationship between learning and behavior. This is because social support factor has been increasingly the important indicator for transfer of training among researchers. Results supported a hypothesized interaction between learning and co-workers support on transfer, such that higher levels of learning and co-workers support increase the positive effects on transfer. Lastly, this study can claim to be investigating training effectiveness in Thai automotive industry; in particular, it makes a significant contribution in applying relevant methodologies to establish training effectiveness by analyzing moderation effect.

### 8.2.2 Implications for HRD Professionals in Thai Automotive Industry

Based on the findings of this dissertation, the implications of the expanded hierarchy model of training evaluation are quite important for training professionals. Practitioners using the four-level approach alone will be quite likely to remain not fully informed about critical aspects of training effectiveness and will consequently arrive at erroneous conclusions about their training programs (Holton, 1996). For training evaluation, if the extent of behavior does not improve as intended, we should examine the amount and types of learning that occurred. However, we should also think about the opportunities that trainees have had to use the training on the job. Furthermore, if organizational results such as improved productivity do not occur, we should examine the quality of job behavior improvement [Chapter 5].

Organizations can improve learning by ensuring that trainees believe that they have the capabilities to successfully learn the new knowledge and skills from training (self-efficacy for learning). This can be improved by (1) showing trainees that other employees who have received the training have successfully improved their knowledge and skills and (2) providing information for trainees on how the learner can achieve success under the training context. Motivation to transfer as a moderating variable has negative effects on the relationship between learning and behavior. That means the positive effect of learning is significantly stronger when trainees have low rather than high motivation to transfer. This implies that at least for the short term, organizations efforts to improve learning for behavior change are more effective for those who have low motivation to transfer. Hence if resources are limited in the organization, efforts should be more for this group, although in the long term they need to find the ways to improve the effects concerned.

Furthermore, the role of social and organizational support in directly affecting behavior change after training and moderating the relationship between learning and behavior demonstrates the practical implications from the training. Organizations should emphasize that trainees who achieve learning will have necessary support from supervisors, peers, and the organization to apply their learned knowledge and skills from training to their work (although more specific analysis on social supports by different providers would suggest different implications) [Chapter 6].

More specifically, the influence of social and organizational support as the moderator on the relationship between learning and behavior was investigated as well. In terms of training transfer in the workplace, the results suggested that co-worker rather than supervisor support should be emphasized to enhance transfer of learning under current conditions. HRD practitioners should be supporting infrastructures that can be used to further enhance co-

worker learning rather than infrastructures for supervisor support or organizational support more directly to trainees. For example, chat room discussions could be utilized to improve training transfer. These discussions could be used to share training ideas and training goals, to discuss barriers to transfer, and to provide positive reinforcement. Although the skill certification system is designed for the automotive industry, we have a variety of occupations for skill certification. If, following training, trainees are able to develop a peer networking or learning system from different organizations for sharing knowledge and skills, it may be potentially beneficial to each organization.

However, for the longer term, organizations should improve the quality of other types of social and organizational support as well to exploit the opportunities for transfer of training more effectively. In other words, trainees should feel that they will receive the support and feedback necessary regarding their performance from the organization and supervisor in order to effectively transfer the training. As implied by the analytical results, under the current conditions, we cannot expect that more provision of supervisor and organizational supports will affect training transfer both independently and in combination with more knowledge retained. Hence, efforts have to be made to improve the quality of those supports. One way this can be accomplished is by creating a climate in which all trainees perceives that training is an important aspect of organizational life that will help trainees become productive member of the organization. For example, the organizations give a chance for trainees to perform the knowledge and skills from training on the job and provide the necessary instrument and infrastructure for the training transfer process. Another way is to provide more assistance such as training and coaching program for supervisors to enable them to support trainees in transferring training to their daily jobs [Chapter 7]

## 8.3 Limitations and Suggestions for Further Research

Although this study has some important results, several limitations should be discussed. First, this study relied on self-assessment measures, which may have caused some common-method variance problems that may inflate observed relationships between variables. Future studies may consider using a research design in which multiple sources of data collection are used, such as direct supervisors. Especially, measuring training transfer is difficult because, to be effective, evaluations of behavioral change and its effectiveness require its systematic appraisal both before and after course completion. Further, where possible, these appraisals should be performed by multiple sources, including the individual receiving the training and his or her superior(s), subordinates, and peers.

Second, regarding the gender representation of the sample, the small number of female participants may limit the generalizability of the findings for both genders.

Third, this study didn't control for a variety of course features and demographic variables that may influence trainees' experiences and evaluation of the training they received, such as their age, gender, income, and hierarchical position, especially for chapter 5 and 6. In addition, where feasible, such evaluations should also include a control, or comparison, group that has not received the training (Ban & Faerman, 1990).

Fourth, although this study is based on a varied sample of companies, trainees, and types of training courses, the extent to which the results can be generalized to other cultural and institutional contexts remains open to question. Thus, future research should seek to examine the extent to which the present results can be reproduced in different countries and should cover a full set of individual controls. This study also suggests the need for better integration of training design in Kirkpatrick's model to better understand training effectiveness. Moreover, we also note that future research should incorporate questions that

address trainee expectations about the program and how their expectations about the program were met. The study also suggests the need for better integration of work environment and individual characteristic variables in Kirkpatrick's model to better understand training effectiveness.

Fifthly, more managers' perspectives should be incorporated. Among others, further empirical studies of training effectiveness need to conduct return on investment (ROI) of skill certification system in Thai automotive industry. For ROI calculations, cost factors must be known and the organization's accounting system must be already tracking them. In addition, benefits are harder to identify and usually there needs to be agreement among stakeholders involved in analyzing the results. In training interventions, increased benefits should come in the form of increased performance of the workforce. When applying ROI calculation to training evaluation, benefits should be calculated by the difference in differences of training by comparison between treatment and control groups and estimating/measuring the difference between benefits before and after the training intervention.

Finally, to evaluate the program more comprehensively, further study should investigate the effectiveness of the program from the different perspective. For example, we can understand the process as the inter-organizational knowledge and technology transfer including international aspect from Japanese experts to Thai trainees.

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*Website*

Thai Automotive Institute (TAI) (www.thaiauto.or.th)

Office of the National Economic and Social Development Board (NESDB) (www.nesdb.go.th)

# Appendices

## Appendix 1: Questionnaire

## Training Effectiveness from Skill Certification System: A Case of Automotive Industry in Thailand

### Part 1: Individual Characteristic

***Name:……Last name…….***

### I. Personal information

1. Which level of Skill Certification System for Automotive Industry do you attend?

   A. Examiner B. Trainer

   C. Trainee(C-1. Level I C-2. Level II C-3. Level III)

2. Have you ever taken any Skill Certification System for Automotive Industry before? If any, which level did you take for each subject?

| | Examiner | Trainer | Trainee | | |
|---|---|---|---|---|---|
| | | | Level I | Level II | Level III |
| A. Die & Mold Finishing | | | | | |
| B. Mechanical Assembly Finishing | | | | | |
| C. Lathe with Numerical Control | | | | | |
| D. Milling with Numerical Control | | | | | |
| E. Mechanical Drawing by Handwriting | | | | | |
| F. Mechanical Drawing by CAD | | | | | |
| G. Electronics Device Assembly | | | | | |
| H. Sequence Control | | | | | |
| I. Hydraulic System Adjustment | | | | | |
| J. Mechanical Maintenance | | | | | |
| K. Electrical Maintenance | | | | | |
| L. Metal Press work/Stamping | | | | | |
| M. Plastic Injection | | | | | |
| N. Machining (Lathe, Milling) | | | | | |
| O. Ferrous Casting | | | | | |
| P. Pneumatic Circuits and Apparatus Devices Assembling | | | | | |

3. Gender

   A. male B. female

4. Age_____ years old

5. Affiliation

   A. Private

   A-1. Automotive assembler  A-2. Automotive parts manufacturer

   A-3.Other manufacturing  A-4. Others (Such as training service provider)

   B. Public training institution

   B-1.University  B-2. Vocational/technical training institution

   B-3. Other educational institution

   C. Others (specify: _____)

6. Occupation

   A. Engineering  B. Technical  C. Production

   D. Managerial  E. Teaching  F. Others (specify: _____)

7. Position

   A. Director level or higher  B. Manager level  C. Supervisor level

   D. Leader level  E. Staff level  F. Others (specify: _____)

8. Income_____Baht/1 month.

9. Average working hours per week

   A. less than 30 hours  B. 30~40 hours  C. 40~50 hours  D. more than 50 hours

10. Length of working in the current organization_____ years _____ months

11. How many years did you work with the other organizations before the current organization____ years_____ months

12. Final educational background (* For the dropout, please choose the schoolyou graduated from. For example, if you quit high school before graduation, choose “A. Junior high school”)

    A. Junior high school  B. High school  C. Vocation School

    D. Teaching School  E. University  G. Graduate School

    H. Others (specify: _____)

## II. Before training

13. How did you acquire necessary knowledge and skill for the current work?

*Please choose the answer by sequence of your important experiences up to three items.*

_____ A. working experiences in the current organization

_____ B. off-the-job training after joining the current organization

_____ C. work experience in the previous organizations

_____ D. off-the-job training during working in the previous organizations

_____ E. self development

_____ F. formal education

_____ G. others (specify _____)

14. Why did you take the Skill Certification System for Automotive Industry?

A. My intention B. Supervisor's advice

C. Organization's policies D. others (specify _____)

## Part 2: Effectiveness of Training

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Very dissatisfied | Dissatisfied | Neither | Satisfied | Very Satisfied |
| **Level 1: Reactions** | | | | | | |
| | ***X1: Satisfaction with instructor dimension*** | | | | | |
| 1 | How satisfied are you with the instructor's knowledge of course material and subject matter? | | | | | |
| 2 | How satisfied are you with the instructor's ability to make you keep interest in course? | | | | | |
| 3 | How satisfied are you with the instructor's presentation and explanation of course materials? | | | | | |
| 4 | How satisfied are you with the instructor's responsiveness to trainee questions and problems? | | | | | |
| 5 | How satisfied are you with instructor's ability to have good relationships to you individually? | | | | | |
| 6 | How satisfied are you with instructor's overall effectiveness? | | | | | |
| | ***X2: Satisfaction with the training management administration process*** | | | | | |
| 7 | How satisfied are you with the availability of training courses for individuals in your job classification? | | | | | |
| 8 | How satisfied are you with the communication of training information to | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Very dissatisfied | Dissatisfied | Neither | Satisfied | Very Satisfied |
| | trainee in your organization? | | | | | |
| 9 | How satisfied are you with the quality of training services provided to trainee? | | | | | |
| 10 | How satisfied are you with registration process and information you received prior to training? | | | | | |
| 11 | How satisfied are you with quality of training courses provided by instructors? | | | | | |
| | ***X3: Satisfaction with the testing process*** | | | | | |
| 12 | How satisfied are you with the fairness of the course exam? | | | | | |
| 13 | How satisfied are you with coverage and importance of material tested? | | | | | |
| 14 | How satisfied are you with feedback you received as result of course testing? | | | | | |
| | ***X4: Utility of training*** | | | | | |
| 15 | How satisfied are you with communication of course objectives in clear, understandable terms? | | | | | |
| 16 | How satisfied are you with match of course objectives with your idea of what would be taught? | | | | | |
| 17 | How satisfied are you with the relevance of the course content to your job? | | | | | |
| 18 | How satisfied are you with course's emphasis on most important information? | | | | | |
| 19 | How satisfied are you with the extent to which the course prepared you to perform current job tasks more effectively? | | | | | |
| 20 | How satisfied are you with the extent to which the course prepared you to perform new job tasks? | | | | | |
| 21 | How satisfied are you with quality of this training course overall? | | | | | |
| | ***X5: Materials*** | | | | | |
| 22 | How satisfied are you with the quality of course materials? | | | | | |
| 23 | How satisfied are you with the audio and visual aids used by the instructor? | | | | | |
| 24 | How satisfied are you with the supplies and equipment for this course? | | | | | |
| 25 | How satisfied are you with classrooms, furniture, learning environment, etc.? | | | | | |
| | ***X6: Course structure*** | | | | | |
| 26 | How satisfied are you with the length of training course? | | | | | |
| 27 | How satisfied are you with the pace of the course material presented? | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| **Level 2: Learning (*Knowledge, Skills and Attitude)*** | | | | | | |
| 1 | My knowledge increased as a result of this course. | | | | | |
| 2 | I feel that newly learned knowledge can do my current job better. | | | | | |
| 3 | I could improve my knowledge to find out problems in the daily job. | | | | | |
| 4 | I could improve my knowledge to solve problems which I found in the daily job. | | | | | |
| 5 | After learning, I got feedback from instructor about how well I was applying the knowledge I learned. | | | | | |
| 6 | I have already forgotten almost every knowledge that this learning covered. (-) | | | | | |
| 7 | I remember almost every knowledge covered in the learning. | | | | | |
| 8 | My skills increased as a result of this course. | | | | | |
| 9 | I feel that my newly learned skill can do current job better. | | | | | |
| 10 | I could improve my skill to find out problems in the daily job. | | | | | |
| 11 | I could improve my skill to solve problems which I found in the daily job. | | | | | |
| 12 | I could improve my leadership skill. | | | | | |
| 13 | I could improve my coaching skill. | | | | | |
| 14 | After training, I got feedback from instructor about how well I was applying the skill I learned. | | | | | |
| 15 | I have already forgotten almost every skill that this training covered. (-) | | | | | |
| 16 | I remember almost every skill covered in the training. | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| **Level 3: Application &Implementation** | | | | | | |
| 1 | Using the new knowledge and skills has helped me improve my work. | | | | | |
| 2 | I can accomplish my job tasks faster than before training. | | | | | |
| 3 | I can accomplish job tasks better by using new knowledge and skills | | | | | |
| 4 | The quality of my work has improved after using new knowledge and skills | | | | | |
| 5 | I make fewer mistakes in production when using new knowledge and skills | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| 6 | I can make quick decisions to solve problems on my job than before training. | | | | | |
| 7 | I have applied the thing covered into my work. | | | | | |
| 8 | I used almost everything that was covered in my work. | | | | | |
| 9 | I used very little of what was covered in this training. (-) | | | | | |
| 10 | I used the things covered in this training almost every day. | | | | | |
| 11 | I remember the main topics learned in the training. | | | | | |
| 12 | I easily say several things learned in the training. | | | | | |
| 13 | Never thought again about the training content. (-) | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| **Level 4: Individual and Organizational Results** | | | | | | |
| 1 | This training was a worthwhile investment in my career development. | | | | | |
| 2 | This course has helped prepare me for other job opportunities within the other company or industry. | | | | | |
| 3 | I am seeking for more chances to change job by using this training. | | | | | |
| 4 | I have been given verbal praise for applying new knowledge and skills. | | | | | |
| 5 | I have received a bonus for improved performance by using new knowledge and skills. | | | | | |
| 6 | I got a wage increase for accomplishing tasks effectively with new knowledge and skills. | | | | | |
| 7 | I received a promotion because I accomplished tasks with distinction. | | | | | |
| 8 | The training program improved my job involvement | | | | | |
| 9 | This training has made me feel more committed to my company. | | | | | |
| 10 | This training has given me a sense of loyalty to my company. | | | | | |
| 11 | This training has made me feel like I will stay with my company for many years. | | | | | |
| 12 | This training was worthwhile investment for my company. | | | | | |
| 13 | This training will improve my job performance. | | | | | |
| 14 | This training will have a significant impact on increasing productivity. | | | | | |
| 15 | This training will have a significant impact on increasing quality. | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| 16 | This training will have a significant impact on decreasing costs. | | | | | |
| 17 | This training will have a significant impact on decreasing cycle time. | | | | | |
| 18 | This training will have a significant impact on increasing sales. | | | | | |

## Part 3: Self-efficacy

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| ***On your newly learned knowledge or skill to be learned this time*** | | | | | | |
| 1 | I am confident in my ability to learn and use newly learned knowledge or skill on the job. | | | | | |
| 2 | I am confident to learn and use newly learned knowledge or skill even in difficult situations. | | | | | |
| 3 | I am confident to learn and use newly learned knowledge or skill of training for overcoming obstacles. | | | | | |
| 4 | I feel confident that my newly learned knowledge or skill equal or exceed those of trainees. | | | | | |
| 5 | I don't feel that I was as capable of performing well in the test after training as other people. (-) | | | | | |
| 6 | I think I can retain much of my knowledge and skill of training. | | | | | |

## Part 4: Learning Motivation

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| 1 | My workload allows me time to try the new things I have learned. | | | | | |
| 2 | I was motivated to learn the skills emphasized in this training program. | | | | | |
| 3 | Taking training courses and seminars is not a high priority for me. (-) | | | | | |
| 4 | I think this was a good chance to improve my task ability. | | | | | |
| 5 | I will try to learn as much as I can from this training course. | | | | | |
| 6 | I am willing to exert considerable effort in the training program in order to improve my skills. | | | | | |

## Part 5: Social Support

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| **Supervisor** | | | | | | |
| 1 | My supervisor sets goals for me that encourage me to apply my training on the job. | | | | | |
| 2 | My supervisor opposes the use of the techniques I learned in training. (-) | | | | | |
| 3 | My supervisor provides me with the time I need to practice the skills learned in training. | | | | | |
| 4 | My supervisor encourages employees to improve their skills whenever possible. | | | | | |
| 5 | My supervisor sets criteria for applying new knowledge and skills to my job. | | | | | |
| 6 | My supervisor provides assistance when I have a problem trying out knowledge and skills. | | | | | |
| 7 | My supervisor discusses how to apply knowledge and skills to job situations. | | | | | |
| 8 | My supervisor informs me how I will accomplish tasks by using knowledge and skills. | | | | | |
| 9 | My supervisor informs me of our group performance in accomplishing tasks. | | | | | |
| 10 | My immediate supervisor is frequently sharing work-related information/knowledge to me. | | | | | |
| 11 | Information/knowledge being shared by my immediate supervisor is relevant to support my work. | | | | | |
| 12 | My immediate supervisor is very open and has a good willingness to share work-related information/knowledge. | | | | | |
| **Co-worker** | | | | | | |
| 13 | My colleagues encourage me to use the knowledge and skills I have learned in training. | | | | | |
| 14 | In my department we discuss how to use what we learn in training. | | | | | |
| 15 | My peers help me with information in applying new knowledge and skills. | | | | | |
| 16 | My peers care about my applying new knowledge and skills on the job. | | | | | |
| 17 | My co-workers/peers frequently share work-related information/knowledge to me. | | | | | |
| 18 | My co-workers/peers are very open and have a good willingness to share work-related information/knowledge. | | | | | |
| **Organizational** | | | | | | |
| 19 | Learning is planned and purposeful of my organization. | | | | | |
| 20 | My organization provides training opportunities and training information for | | | | | |

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| | workers. | | | | | |
| 21 | My organization has a strategy plan and interest in personal and professional development of employees. | | | | | |
| 22 | Training is encouraged and rewarded in my organization. | | | | | |
| 23 | Inefficient and inf exible workspace in my organization for teaching knowledge and skills from training to other employees. (-) | | | | | |
| 24 | Space not shared, creating communication barriers in my organization. (-) | | | | | |
| 25 | My organization is available of technology and equipment for me to apply knowledge and skills on my job and teaching to other employees. | | | | | |

## Part 6: Motivation to Transfer Training

| Items | Questions | Scales | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | Disagree strongly | Disagree somewhat | Neutral | Agree somewhat | Agree strongly |
| 1 | At work, I am motivated to apply new knowledge. | | | | | |
| 2 | I get excited when I think about trying to use my new learning in my job. | | | | | |
| 3 | I will look for opportunities to use the skills which I have learned. | | | | | |
| 4 | I am highly motivated to apply the skills I learned in this training to my daily work. | | | | | |
| 5 | I believe the training will help me do my current job better. I plan to use what I learned on the job. | | | | | |
| 6 | The knowledge and skills I learned in the training program will be helpful in solving work-related problems. | | | | | |

## Appendix 2: The Results of Factor Loading

| Items | Questions | Factor Loading | Factors | Accepted/ Rejected |
|---|---|---|---|---|
| **Level 1: Reactions** | | | | |
| | ***Satisfaction with instructor dimension*** | | | |
| 1 | How satisfied are you with the instructor's knowledge of course material and subject matter? | 0.805 | Factor 1 | Accepted |
| 2 | How satisfied are you with the instructor's ability to make you keep interest in course? | 0.892 | Factor 1 | Accepted |
| 3 | How satisfied are you with the instructor's presentation and explanation of course materials? | 0.560 | Factor 1 | Accepted |
| 4 | How satisfied are you with the instructor's responsiveness to trainee questions and problems? | 0.630 | Factor 2 | Accepted |
| 5 | How satisfied are you with instructor's ability to have good relationships to you individually? | 0.781 | Factor 2 | Accepted |
| 6 | How satisfied are you with instructor's overall effectiveness? | 0.636 | Factor 2 | Accepted |
| | ***Satisfaction with the training management administration process*** | | | |
| 7 | How satisfied are you with the availability of training courses for individuals in your job classification? | 0.827 | Factor 3 | Accepted |
| 8 | How satisfied are you with the communication of training information to trainee in your organization? | 0.868 | Factor 3 | Accepted |
| 9 | How satisfied are you with the quality of training services provided to trainee? | 0.197 | Factor 3 | Rejected |
| 10 | How satisfied are you with registration process and information you received prior to training? | 0.896 | Factor 4 | Accepted |
| 11 | How satisfied are you with quality of training courses provided by instructors? | 0.783 | Factor 4 | Accepted |
| | ***Satisfaction with the testing process*** | | | |
| 12 | How satisfied are you with the fairness of the course exam? | 0.837 | Factor 5 | Accepted |
| 13 | How satisfied are you with coverage and importance of material tested? | 0.814 | Factor 5 | Accepted |
| 14 | How satisfied are you with feedback you received as result of course testing? | 0.498 | Factor 5 | Accepted |
| | ***Utility of training*** | | | |
| 15 | How satisfied are you with communication of course objectives in clear, understandable terms? | 0.896 | Factor 6 | Accepted |
| 16 | How satisfied are you with match of course objectives with your idea of what would be taught? | 0.911 | Factor 6 | Accepted |
| 17 | How satisfied are you with the relevance of the course content to your job? | 0.600 | Factor 7 | Accepted |
| 18 | How satisfied are you with course's emphasis on most important information? | 0.874 | Factor 7 | Accepted |
| 19 | How satisfied are you with the extent to which the course prepared you to perform current job tasks more effectively? | 0.619 | Factor 7 | Accepted |
| 20 | How satisfied are you with the extent to which the course prepared you to perform new job tasks? | 0.842 | Factor 8 | Accepted |
| 21 | How satisfied are you with quality of this training course overall? | 0.799 | Factor 8 | Accepted |
| | ***Materials*** | | | |
| 22 | How satisfied are you with the quality of course materials? | 0.871 | Factor 9 | Accepted |
| 23 | How satisfied are you with the audio and visual aids used by the instructor? | 0.825 | Factor 9 | Accepted |

| Items | Questions | Factor Loading | Factors | Accepted/ Rejected |
|---|---|---|---|---|
| 24 | How satisfied are you with the supplies and equipment for this course? | 0.181 | Factor 9 | Rejected |
| 25 | How satisfied are you with classrooms, furniture, learning environment, etc.? | 0.857 | Factor 9 | Accepted |
| | ***Course structure*** | | | |
| 26 | How satisfied are you with the length of training course? | 0.509 | Factor 10 | Accepted |
| 27 | How satisfied are you with the pace of the course material presented? | 0.455 | Factor 10 | Accepted |
| **Level 2: Learning (*Knowledge, Skills and Attitude)*** | | | | |
| 1 | My knowledge increased as a result of this course. | 0.880 | Factor 1 | Accepted |
| 2 | I feel that newly learned knowledge can do my current job better. | 0.853 | Factor 1 | Accepted |
| 3 | I could improve my knowledge to find out problems in the daily job. | 0.759 | Factor 2 | Accepted |
| 4 | I could improve my knowledge to solve problems which I found in the daily job. | 0.809 | Factor 2 | Accepted |
| 5 | After learning, I got feedback from instructor about how well I was applying the knowledge I learned. | 0.854 | Factor 3 | Accepted |
| 6 | I have already forgotten almost every knowledge that this learning covered. (-) | 0.827 | Factor 3 | Accepted |
| 7 | I remember almost every knowledge covered in the learning. | 0.545 | Factor 3 | Accepted |
| 8 | My skills increased as a result of this course. | 0.804 | Factor 4 | Accepted |
| 9 | I feel that my newly learned skill can do current job better. | 0.840 | Factor 4 | Accepted |
| 10 | I could improve my skill to find out problems in the daily job. | 0.570 | Factor 4 | Accepted |
| 11 | I could improve my skill to solve problems which I found in the daily job. | 0.527 | Factor 4 | Accepted |
| 12 | I could improve my leadership skill. | 0.898 | Factor 5 | Accepted |
| 13 | I could improve my coaching skill. | 0.901 | Factor 5 | Accepted |
| 14 | After training, I got feedback from instructor about how well I was applying the skill I learned. | 0.791 | Factor 6 | Accepted |
| 15 | I have already forgotten almost every skill that this training covered. (-) | 0.808 | Factor 6 | Accepted |
| 16 | I remember almost every skill covered in the training. | 0.644 | Factor 6 | Accepted |
| **Level 3: Application &Implementation** | | | | |
| 1 | Using the new knowledge and skills has helped me improve my work. | 0.840 | Factor 1 | Accepted |
| 2 | I can accomplish my job tasks faster than before training. | 0.874 | Factor 1 | Accepted |
| 3 | I can accomplish job tasks better by using new knowledge and skills | 0.687 | Factor 2 | Accepted |
| 4 | The quality of my work has improved after using new knowledge and skills | 0.477 | Factor 2 | Accepted |
| 5 | I make fewer mistakes in production when using new knowledge and skills | 0.756 | Factor 3 | Accepted |
| 6 | I can make quick decisions to solve problems on my job than before training. | 0.802 | Factor 3 | Accepted |
| 7 | I have applied the thing covered into my work. | 0.182 | Factor 4 | Rejected |
| 8 | I used almost everything that was covered in my work. | 0.739 | Factor 4 | Accepted |
| 9 | I used very little of what was covered in this training. (-) | 0.872 | Factor 4 | Accepted |
| 10 | I used the things covered in this training almost every day. | 0.725 | Factor 5 | Accepted |
| 11 | I remember the main topics learned in the training. | 0.872 | Factor 5 | Accepted |
| 12 | I easily say several things learned in the training. | 0.755 | Factor 4 | Accepted |
| 13 | Never thought again about the training content. (-) | 0.821 | Factor 4 | Accepted |
| **Level 4: Individual and Organizational Results** | | | | |

| Items | Questions | Factor Loading | Factors | Accepted/ Rejected |
|---|---|---|---|---|
| 1 | This training was a worthwhile investment in my career development. | 0.846 | Factor 1 | Accepted |
| 2 | This course has helped prepare me for other job opportunities within the other company or industry. | 0.875 | Factor 1 | Accepted |
| 3 | I am seeking for more chances to change job by using this training. | 0.666 | Factor 2 | Accepted |
| 4 | I have been given verbal praise for applying new knowledge and skills. | 0.757 | Factor 2 | Accepted |
| 5 | I have received a bonus for improved performance by using new knowledge and skills. | 0.796 | Factor 2 | Accepted |
| 6 | I got a wage increase for accomplishing tasks effectively with new knowledge and skills. | 0.534 | Factor 2 | Accepted |
| 7 | I received a promotion because I accomplished tasks with distinction. | 0.307 | Factor 3 | Rejected |
| 8 | The training program improved my job involvement | 0.743 | Factor 3 | Accepted |
| 9 | This training has made me feel more committed to my company. | 0.875 | Factor 3 | Accepted |
| 10 | This training has given me a sense of loyalty to my company. | 0.682 | Factor 4 | Accepted |
| 11 | This training has made me feel like I will stay with my company for many years. | 0.856 | Factor 4 | Accepted |
| 12 | This training was worthwhile investment for my company. | 0.768 | Factor 4 | Accepted |
| 13 | This training will improve my job performance. | 0.846 | Factor 5 | Accepted |
| 14 | This training will have a significant impact on increasing productivity. | 0.833 | Factor 5 | Accepted |
| 15 | This training will have a significant impact on increasing quality. | 0.588 | Factor 5 | Accepted |
| 16 | This training will have a significant impact on decreasing costs. | 0.127 | Factor 3 | Rejected |
| 17 | This training will have a significant impact on decreasing cycle time. | 0.823 | Factor 6 | Accepted |
| 18 | This training will have a significant impact on increasing sales. | 0.844 | Factor 6 | Accepted |
| **Self-efficacy** | | | | |
| ***On your newly learned knowledge or skill to be learned this time*** | | | | |
| 1 | I am confident in my ability to learn and use newly learned knowledge or skill on the job. | 0.861 | Factor 1 | Accepted |
| 2 | I am confident to learn and use newly learned knowledge or skill even in difficult situations. | 0.893 | Factor 1 | Accepted |
| 3 | I am confident to learn and use newly learned knowledge or skill of training for overcoming obstacles. | 0.407 | Factor 1 | Accepted |
| 4 | I feel confident that my newly learned knowledge or skill equal or exceed those of trainees. | 0.777 | Factor 2 | Accepted |
| 5 | I don't feel that I was as capable of performing well in the test after training as other people. (-) | 0.788 | Factor 2 | Accepted |
| 6 | I think I can retain much of my knowledge and skill of training. | 0.506 | Factor 2 | Accepted |
| **Learning Motivation** | | | | |
| 1 | My workload allows me time to try the new things I have learned. | 0.705 | Factor 1 | Accepted |
| 2 | I was motivated to learn the skills emphasized in this training program. | 0.924 | Factor 1 | Accepted |
| 3 | Taking training courses and seminars is not a high priority for me. (-) | 0.725 | Factor 1 | Accepted |
| 4 | I think this was a good chance to improve my task ability. | 0.538 | Factor 2 | Accepted |
| 5 | I will try to learn as much as I can from this training course. | 0.869 | Factor 2 | Accepted |
| 6 | I am willing to exert considerable effort in the training program in order to improve my skills. | 0.774 | Factor 2 | Accepted |

| Items | Questions | Factor Loading | Factors | Accepted/ Rejected |
|---|---|---|---|---|
| **Social Support** | | | | |
| **Supervisor** | | | | |
| 1 | My supervisor sets goals for me that encourage me to apply my training on the job. | 0.780 | Factor 1 | Accepted |
| 2 | My supervisor opposes the use of the techniques I learned in training. (-) | 0.781 | Factor 1 | Accepted |
| 3 | My supervisor provides me with the time I need to practice the skills learned in training. | 0.619 | Factor 1 | Accepted |
| 4 | My supervisor encourages employees to improve their skills whenever possible. | 0.672 | Factor 2 | Accepted |
| 5 | My supervisor sets criteria for applying new knowledge and skills to my job. | 0.792 | Factor 2 | Accepted |
| 6 | My supervisor provides assistance when I have a problem trying out knowledge and skills. | 0.650 | Factor 3 | Accepted |
| 7 | My supervisor discusses how to apply knowledge and skills to job situations. | 0.804 | Factor 3 | Accepted |
| 8 | My supervisor informs me how I will accomplish tasks by using knowledge and skills. | 0.729 | Factor 3 | Accepted |
| 9 | My supervisor informs me of our group performance in accomplishing tasks. | 0.808 | Factor 4 | Accepted |
| 10 | My immediate supervisor is frequently sharing work-related information/knowledge to me. | 0.796 | Factor 4 | Accepted |
| 11 | Information/knowledge being shared by my immediate supervisor is relevant to support my work. | 0.754 | Factor 5 | Accepted |
| 12 | My immediate supervisor is very open and has a good willingness to share work-related information/knowledge. | 0.831 | Factor 5 | Accepted |
| **Co-worker** | | | | |
| 13 | My colleagues encourage me to use the knowledge and skills I have learned in training. | 0.871 | Factor 1 | Accepted |
| 14 | In my department we discuss how to use what we learn in training. | 0.793 | Factor 1 | Accepted |
| 15 | My peers help me with information in applying new knowledge and skills. | 0.771 | Factor 2 | Accepted |
| 16 | My peers care about my applying new knowledge and skills on the job. | 0.803 | Factor 2 | Accepted |
| 17 | My co-workers/peers frequently share work-related information/knowledge to me. | 0.742 | Factor 3 | Accepted |
| 18 | My co-workers/peers are very open and have a good willingness to share work-related information/knowledge. | 0.861 | Factor 3 | Accepted |
| **Organizational** | | | | |
| 19 | Learning is planned and purposeful of my organization. | 0.105 | Factor 2 | Rejected |
| 20 | My organization provides training opportunities and training information for workers. | 0.827 | Factor 1 | Accepted |
| 21 | My organization has a strategy plan and interest in personal and professional development of employees. | 0.881 | Factor 1 | Accepted |
| 22 | Training is encouraged and rewarded in my organization. | 0.395 | Factor 2 | Rejected |
| 23 | Inefficient and inf exible workspace in my organization for teaching knowledge and skills from training to other employees. (-) | 0.795 | Factor 2 | Accepted |
| 24 | Space not shared, creating communication barriers in my organization. (-) | 0.705 | Factor 2 | Accepted |
| 25 | My organization is available of technology and equipment for me | 0.449 | Factor 2 | Accepted |

| Items | Questions | Factor Loading | Factors | Accepted/ Rejected |
|---|---|---|---|---|
| | to apply knowledge and skills on my job and teaching to other employees. | | | |
| **Motivation to Transfer Training** | | | | |
| 1 | At work, I am motivated to apply new knowledge. | 0.892 | Factor 1 | Accepted |
| 2 | I get excited when I think about trying to use my new learning in my job. | 0.906 | Factor 1 | Accepted |
| 3 | I will look for opportunities to use the skills which I have learned. | 0.808 | Factor 2 | Accepted |
| 4 | I am highly motivated to apply the skills I learned in this training to my daily work. | 0.798 | Factor 2 | Accepted |
| 5 | I believe the training will help me do my current job better. I plan to use what I learned on the job. | 0.801 | Factor 3 | Accepted |
| 6 | The knowledge and skills I learned in the training program will be helpful in solving work-related problems. | 0.885 | Factor 3 | Accepted |

***Note:*** The criteria for accepted the question was factor loading > 0.4.