EMPLOYEE'S HEALTH MANAGEMENT EVALUATION SYSTEM

FOR THE ENTERPRISE

MS. YUAN FENG

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL

FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER DEGREE OF ARTS IN HUMAN RESOURCE DEVELOPMENT AND MANAGEMENT
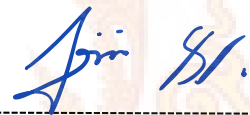
INTERNATIONAL COLLEGE,

RAJAMANGALA UNIVERSITY OF TECHNOLOGY KRUNGTHEP

ACADEMIC YEAR 2021

Independent Study	EMPLOYEE'S HEALTH MANAGEMENT EVALUATION SYSTEM FOR THE ENTERPRISE
Author	Yuan Feng
Major	Master of Arts in Human Resource Development and Management (M. A.)
Advisor	Dr. Arti Pandey

Faculty of Human Resource Development and Management International College, Rajamangala University of Technology Krungthep approved this independent study as partial fulfillment of the requirement for the Master Degree of Arts in Human Resource Development and Management
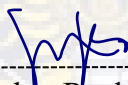
--- Dean of International College

(Dr. Jirangrug Samarkjarm)

Examination Committee
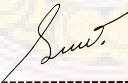
--- Committee Chairperson

(Asst. Prof. Dr. Prajak Chertchom)

--- Committee

(Dr. Marlon Rael Astillero)

--- Committee and Advisor

(Dr. Arti Pandey)

Independent Study	EMPLOYEE'S HEALTH MANAGEMENT EVALUATION SYSTEM FOR THE ENTERPRISE
Author	Ms. Yuan Feng
Major	Master of Arts in Human Resource Development and Management (M A.)
Advisor	Dr. Arti Pandey
Academic year	2021

ABSTRACT

Employee health management is a very important subject in human resource management. The purpose of this research is to try to establish one employee health management evaluation system for enterprises. The research was conducted by distributing the questionnaires by e-mail or face-to-face delivery to human resource management experts who work in the universities and enterprises in China. A total of 30 questionnaires were distributed and returned for the first round and a total of 20 questionnaires were distributed and 18 were returned for the second round. The data collected from those questionnaires were analyzed by modified Delphi method and analytic hierarchy process. The results show that the evaluation index system of employee health management is constructed, including 2 primary indexes, 9 secondary indicators and 34 third indicators. Two enterprises were evaluated by the employee health management system and the result shows that the index system can accurately reflect the implementation of employee health management, and can provide guidance for enterprises to carry out activities on employee health management. The results show that the purpose of this study to establish a set of evaluation index system is achieved by modified Delphi method and analytic hierarchy process analysis method, and the two independent variables of health management process and health management results are significantly related to the enterprises employees' health management. Future research should expand the depth of research content and increase the number of participating enterprises to modify, improve and perfect the evaluation system.

Key words: enterprise employee's health management evaluation, health management process, health management results.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Health management is an activity process of comprehensive detection, evaluation and effective intervention of individual or group health risk factors (Zhang & He, 2018). Health management is a comprehensive subject integrating life science, epidemiology, social medicine, management and informatics (Bai, 2008). It originates from and depends on the development of modern medical science and technology, but it is different from traditional preventive medicine and clinical medicine. With the deepening of the reform of China's market economy, especially the marketing reform of medical and health system, the acceleration of industrialization and the increase of competition pressure, not only has the high incidence of industrial accidents and occupational diseases happened, but also the psychological problems of anxiety, helplessness, strangeness and depression arise accordingly. The poor health of employees will seriously affect or restrict their intelligence, and cause serious losses to the enterprise, so this paper takes employee health management as the research objective.

1.1 The Statement of the Research Problem

According to the survey of the health status of Chinese cities in 2019, more than 60% of Chinese enterprises are in "sub health", and overdraft among elite and senior executives is the most serious, with 91% and 86% of sub-health respectively, and 10.3% of them overworked. A survey of 58,912 residents in more than 10 provinces and cities including Beijing, Shanghai and Shenyang completed by the health line of Chinese enterprise employees shows that 42.4% of respondents think they are "sub health"; 31.6% of them are "slightly uncomfortable occasionally"; 13.7% of them "feel bad and have chronic diseases"; only 12.4% think they are "healthy", while 78.9% of them are psychologically. The staff had a restless mood, with 59.4% feeling anxious and 38.6% feeling depressed (Xie, 2020).

The poor health of employees will seriously affect or restrict their intelligence, and cause serious losses to the enterprise (Li, 2019). There are mainly two kinds of losses. One is direct, which refers to the medical insurance expenses that the enterprise must provide for the employees. The other is indirect, which is the low efficiency and waste of working time caused by a series of phenomena such as employees' absence rate rising due to sick leave, or "not working hard" due to poor health. In fact, these bad conditions are not unchangeable. Through the management of employees' health, such as health education, safety management, disease management, enterprises will reduce the cost of medical care, obtain efficient employees, improve the productivity of enterprises, and establish a healthy and good reputation.

However, enterprises still have doubts about the implementation of employee health management due to the following reasons (Wu, 2007). Firstly, due to the complexity of the

influencing factors of employee health, such as natural and social factors, internal factors and personal factors, enterprises are not sure how much the implementation of health management can improve the health of employees, and cannot directly see the economic effect of employee health management. Secondly, even if the implementation of health management in enterprises is not effective, enterprises cannot directly see the economic effect of employee health management. It is difficult to determine which activities of employee health management are more important and worthy of implementation. Enterprises may feel confused about employee health management because some management processes have no measurable results. Therefore, it is of great significance to establish a set of scientific and practical evaluation index system of employee health management. It is an important guarantee for enterprises to systematically and effectively implement long-term employee health management and achieve the expected goal. Through the evaluation of the management process and results of employee health management, enterprises can not only improve the deficiencies of employee health management, but also quickly learn the methods of employee health management and improve the level of employee health management.

1.2 Research Objective

1.2.1 Is it feasible to establish a set of evaluation index system that can be applied to the actual enterprise employee health management?

1.2.2 Are the two independent variables of health management process and health management results based on human capital theory are significantly related to the enterprises employees' health management by Modified Delphi method and analytic hierarchy process method?

1.2.3 Is the employee health management evaluation system practical?

1.3 Purpose of the Study

The implementation of employee health management in enterprises will bring economic and social benefits to the enterprises. Therefore, this thesis employs a quantitative method to explore a scientific evaluation system of employee's health management. The purposes of this study are:

1.3.1 To explore a set of evaluation index system that can be applied to the enterprise's employee health management by literature review.

1.3.2 To explore the two independent variables of health management process and health management results which may be found to be significantly related to the enterprises employees' health management analyzed by Modified Delphi method and analytic hierarchy process method. In the present research, the questionnaires were distributed by e-mail or face-to-face delivery to human resource management experts who work in the

universities and enterprises to collect the data for analysis.

1.3.3 To test and verify the employee's health management evaluation system for practical use by two local enterprises in Chengdu, Sichuan, China

1.4 Scope

Enterprise employee health management evaluation refers to the comprehensive evaluation of the purpose, value or effect and efficiency of the management system, management process, input-output, long-term mechanism and other aspects of enterprise employee health management. The use of the evaluation results will provide guidance for the economic activities of enterprises and meet the requirements of enterprise survival and development. Therefore, this study targets the subject of employee health management to enterprises (including foreign enterprises, state-owned enterprises, private enterprises, etc.) instead of considering other subjects, such as the state and government, third-party service agencies, etc. Based on existing relevant research on employee health management at home and abroad, this study attempts to establish an enterprise employee health management system in order to solve the following problems:

Firstly, it is important to define the connotation of employee health management. Foreign research on employee health management has been relatively mature. However, the research in this field is still developing in China. At present, there is no unified definition of employee health management, because its connotation and extensions are not consistently defined. With the continuous change of society, the connotation and extension of employee health management are becoming unclear. Therefore, the primary task of this paper is to operationally define the connotation and denotation of enterprise employee health management, so as to effectively evaluate the enterprise employee health management behavior.

Secondly, this study attempts to work on the construction of an evaluation index system of enterprise employee health management. The health of employees is affected by many factors, such as natural and social factors, internal factors and personal factors, which make the health management of employees full of uncertainty. Enterprises do not know where the health problems of employees is, what is the first problem to be solved, and what are the key and difficult problems in health management. Therefore, it is necessary to establish a set of effective index system to evaluate the management process and results of employee health management, so that enterprises can clearly know the current management level and the benefits that can be brought through the implementation of health management. However, it is precisely because of the complexity of the process of employee health management and the difficulty of measuring the results that building a perfect evaluation index system is the focus and difficulty of this study.

Thirdly, it is og great significance to apply the index system to practice. To verify the accuracy of the index system, we must put it into practice. In this study, the evaluation index system of enterprise employee health management is applied to two different levels

of enterprises, and the evaluation results are compared with the actual situation of enterprise employee health management, in order to test its accuracy and effectiveness.

1.5 Benefits of the Research

This study is of great significance theoretically and practically.

Theoretically, this research is an exploratory research. Through combing and studying the literature at home and abroad, combined with the current situation of employee health management in Chinese enterprises, using expert questionnaire, Delphi method and other scientific decision-making methods, this thesis integrates a set of practical evaluation principles and methods, and creatively evaluates the management process and results of employee health management in enterprises.

Practically, the health management of enterprise employees is the performance that the enterprise invests the health status of employees as an important resource and productivity. The evaluation of the management process and results of the health management of enterprise employees is an important content of the performance evaluation of human resource management. It is also the necessity of the implementation of employee health management, not only for department managers and implementers of health management projects. Additionally, it can also help enterprises improve employee health management mechanism and resource allocation, and avoid this work becoming mere formality. Specifically, there are four practical values:

(1) It is helpful for enterprise and decision-making departments to scientifically evaluate the implementation of employee health management, rather than to simply complete the relevant work;

(2) Employee health management service is an integrated process, and the evaluation of its management process and management results is a practical innovation;

(3) Any effective evaluation index is a process of continuous updating and upgrading. With the systematization and standardization of the index, it will inevitably promote the transformation of the overall service concept and the improvement of the service level of the health management service industry;

(4) The establishment and application of the evaluation index system is an important guarantee for enterprises to systematically and effectively carry out long-term employee health management and achieve the established goals. It has strong practical value for enterprises to quickly learn the methods of employee health management and improve the level of employee health management.

CHAPTER 2

LITERATURE REVIEW

Health management is composed of two words "health" and "management". To define the concept of health management is the premise to rationalize and analyze the meaning of health. In 1947, the World Health Organization (WHO) proposed the first multidimensional definition of health. It is defined as a state of good physical, psychological and social adaptability, not just absence of disease and weakness. The overall health and AnTai movement in 1960s thought that "health is an interactive and dynamic multidimensional structure, which consists of body dimension, emotional dimension, rational dimension, social dimension, spiritual dimension, occupation dimension and environmental dimension". In 1986, health was redefined as "a resource of daily life, not a purpose of life, a resource of society and individual, and a manifestation of individual ability." In 1989, the World Health Organization claimed that "health includes physical, mental, social adaptation and moral health." (Huang & Jin, 2019). Therefore, the health of today's society can be obtained by means of preventive health care, different from that of the 1930s and 1940s, which was mainly based on the progress of medical technology.

2.1 Literature Review

2.1.1 Connotation of health management

Health management originated in the United States, and its theory and practice can be traced back to many years ago. However, the officially recorded research on health management began many years ago. Some expert pointed out that "health management is a process of comprehensively controlling the health risk factors of individuals and a group of people, which is a planned, organized and systematic process aimed at improving social health awareness, people's health behavior, and the quality of life of individuals"(Schultz & Edington, 2007). Wang (2020) reported that health management is an active, organized and cost-effective preventive measure that employs new technologies to reduce incidence rate and improve personal health, health service utilization and personal productivity.

In recent years, more and more scholars in China began to study health management. Su (1994) is the first scholar studying the concept of health management in China (Wang, 2020). In terms of health medicine, he argues that "health management is to use the theories and methods of management science, mobilize the enthusiasm of all organizations and members of the whole society through purposeful, planned and organized management means, and effectively intervene in the group and individual health, so as to maintain and consolidate the purpose of promoting group and individual health ". Additionally, Bai (2005) provides two representative definitions of health management in China, which are "health

management is the process of comprehensive management of individual and population health risk factors" and "health management is the process of comprehensive monitoring, analysis and evaluation of individual or group health." Moreover, Yan (2006) believes that "health management can be understood as the application of management theories and methods in improving social health awareness, disease prevention, clinical diagnosis and treatment, rehabilitation and health care and other aspects of applied medicine". Furthermore, some scholars suggest that health management can be divided into narrow sense and broad sense. For example, Wang (2012) thinks that the narrow sense of health management refers to the establishment of health records based on the results of physical examination, the evaluation of health status, and the targeted personalized health management scheme, while Wu and Li (2009) believe that the broad sense of health management is to build a complete and comprehensive health management system by absorbing resources from scientific health service system in multiple industries. Qu et al., (2016) suggests that the connotation of health management can be analyzed from three perspectives: (1) from the medical perspective, health management is centered on the health of individuals and groups; (2) from the management perspective, health management is a process management category; (3) with the continuous development of information technology, it is necessary to collect and analyze health information eletronically, and apply network to carry out dynamic health management.

Chen et al. (2006) proposes a cycle model of health management (Figure 2.1.1-1). Health management is a continuous cycle process, that is, detection of health risk factors (Discovery) - Evaluation (recognition) - Intervention (solution) - Re-detection - Reevaluation and Re intervention. Among them, the intervention of health risk factors is the focus of health management. The continuous cycle of health management improves the health managed.

Wang et al. (2017) arguse that health management should first let the management objects understand the risk factors that affect their health, and then master the prevention and control methods of health risk factors, and provide feedback based on the results, so as to realize the continuous cycle of "knowledge, action, result" mode. The mode of health management is "confidant" mode (Refer to Figure 2.1.1-2).

Mao et al., (2020) believes that in the individual health management system there are six modules: medical data, examination result analysis, preventive examination, statistical reports, medical knowledge base and other auxiliary functions. They also think that in the individual health management information system there are five modules: management function, physical examination information, health risk assessment, health education and system information, which are all theories recognized by the academic circles.

Generally speaking, the current research situation of health management in China needs to be improved. The basic research of health management is limited, and the research objects are mainly patients with chronic diseases (Wang et al., 2017). In China, the standard database of public health monitoring has not been established, and the research on health assessment, health needs and health management mode is relatively insufficient. Xu (2021)

reports that the connotation of health management and the characteristics of health management are summarized as follows. First, the object of health management is human health. Second, health management is an integrated management.
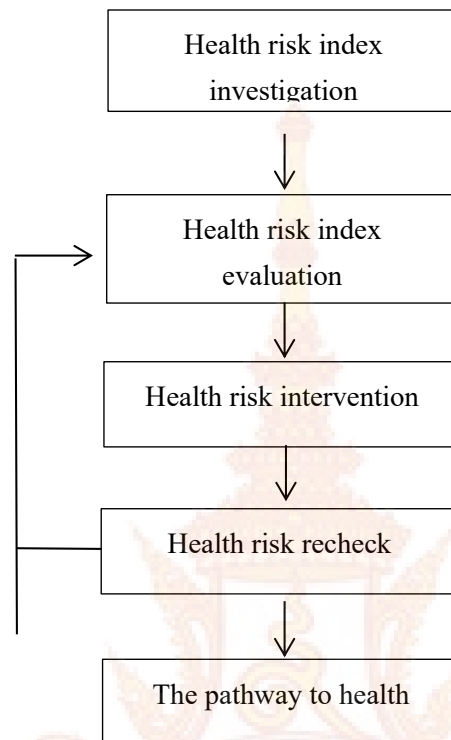
Figure 2.1 Cycle model of health management

Source：Chen, J. X., & Ma, L.C. Yu, W.L., Zhou, Z.T., & Zhou, Z.K. (2006). Idea and practice of "health management". *China's public health management*, *22*(001), 7-10.
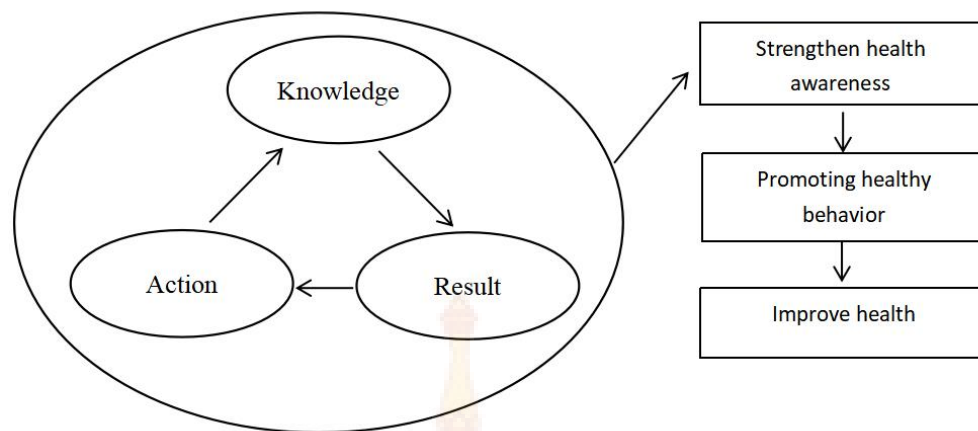
Figure 2.2 Confidant mode of health management

Souce: Wang, Y. Y., Chen,J.X, Wang H.L, Yang,G.H, Gao,Z.X, Lu,L.P， Hu,Y.K, Zhou,J, Yu, W.L, & Qian,J. (2017). Health management model blocking the natural process of chronic diseases from the source. *Public health management in China*(2), 123-127.

It not only includes disease prevention, diagnosis and treatment, but also uses advanced technology to collect, analyze and evaluate human health information. Additionally, it adopts comprehensive intervention measures to scientifically manage human health. Third, the subject of health management can be an individual, an organization or a country. With the advent of the era of knowledge economy, health has not only become a personal wealth, but also a vital factor for the development of enterprises, society and the country.

2.1.2 The emergence and development of health management

The history of health and health management can be traced back thousands of years. The idea of health management has long been contained in the ancient Western medical literature. Hippocrates, the medical representative of ancient Greece, believed that "people who can understand life can also understand the highest value of health to people"(2103). According to Dr. Gaiqi of giroma (2016), "health and disease are related to three factors that can be affected by people's will and action, namely, air, exercise and rest, sleep and awakening, food and drink, satisfaction and evacuation, and emotional excitement." Sears (2012), a Roman encyclopedia scholar in the 20th century, pointed out that medical practice consists of three parts: treatment through lifestyle, drug treatment and surgical treatment (Zhou, & Jiang, 2019).

The idea of health management first appeared in the United States (Huang, 2006). In 1929, Blue Cross and Blue Shield began to explore the practice of health management in the process of providing basic medical services for teachers and workers. In the United

States, Rose Luce medical group, founded in 1929, is considered the first real health organization. Since the beginning of the 20th century, the prevalence of chronic diseases in the United States has continued to rise. The growing medical demand and limited medical resources have led to a sharp rise in medical expenses, and 75% of the medical expenses are spent on the treatment of chronic diseases. In 1969, HMO (Health maintenance organization) was incorporated into the national health insurance system by the federal government of the United States, and legislated in 1971 (Loeppke et al, 2010). In 1978, in order to study the influence of lifestyle and behavior habits on people's health and quality of life, and understand how health status affects the use of public health resources, the health management research center was established in the University of Michigan. In the mid-1990s, disease management emerged in the U.S. healthcare market. American Society of Occupational and Environmental Medicine, Mayo Medical Group, Duke University, etc. have studied the model development and effect evaluation of health management. In recent years, the attempts of American enterprises in controlling medical expenses can be summarized into the following three categories: cost transfer, consumer orientation and employee health management. The cost transfer strategy is to share the medical expenses with employees, or set up a certain cost bearing ratio when the employees go to see a doctor, in order to control the medical expenses within the appropriate range. The consumer oriented strategy is that, in the group health care plan, the enterprise gives employees greater autonomy, and provides more complete information to help the employees achieve their job task. It is expected that through a whole set of means and measures as well as the promotion of healthy lifestyle, employees can keep healthy. Chinese traditional medicine literature has long been including the idea of health management. The concept of "preventive treatment of disease" originated from the Chinese medical classic "Huangdi Neijing" (Chen & Gao, 2016). It is also called "preventive treatment of disease comes first if sage does not treat it, or disorder if not treat it. It's not too late to go through a well and pray for a cone." It contains the idea of "prevention first" in health management. "Running water is not rotten, and household pivot is not sachet, and movement" in Lu's Chunqiu Jinshu, which also indicates the truth that life lies in movement " (Schultz & Edington, 2007). Yuan Kaichang's (2008) three essentials of health preservation in Qing Dynasty emphasizes the importance of "treating the heart" and argues that if you want to treat a disease, you should treat the heart first. As long as we are good at governance, we can get rid of the burden of things and achieve the goal of "increasing life without expecting to live longer". In the Victoria Declaration, the World Health Organization put forward four health foundations: reasonable diet, smoking cessation and alcohol restriction, moderate exercise and psychological balance, which is similar to the perspective of traditional Chinese medicine.

2.1.3 Connotation of employee health management

In 1940, Doctor Lewis first proposed the concept of health risk assessment, which is the embryonic form of modern employee health management concept. He summed up a conclusion from the practice of cervical cancer and heart disease prevention. That is doctors

must record the health risks of patients to guide the disease prevention work. He established the health risk table for the first time, making the results of medical examination more predictive, which has become one of the most significant beginnings of modern population health management system. In 1950, Robbins and his colleagues jointly developed the annual mortality risk table and applied it to the teaching project, which created a new model of applying health risk assessment to the teaching of medical courses, and also laid a foundation for the theory and practice of modern employee health management (Wei & Zhao, 2006). In the 1960s, life insurance developed rapidly in the West. Its actuarial method promoted the quantification of individual death risk probability and health risk assessment received extensive attention. Doctors seize the opportunity to establish a new discipline of predictive medicine and establishes the theoretical system of "health management". In 1970, doctors jointly wrote "how to use prospective medicine", which explains the quantitative relationship between current health risk factors and possible future health outcomes, and provides a complete tool package for assessing health risks, including questionnaires, health risk measurement, etc. So far, health management has secured operational methods in theory and practice, and has practically been used in large-scale application and presented rapid development. Human resource managers in the wider enterprises also gradually began to pay attention to this management method and try to apply it in the enterprise staff group.

In recent years, the field of employee health management has attracted more and more attention of Chinese scholars. The main research fields are related to employee occupational safety and health management and the integration of environment, occupational safety and health management system. The research on the definition, connotation and mode of employee health management has also been developed. Specifically, Shen (2017) proposes that the health management of enterprise employees is the application of modern medical technology and information technology to systematically pay attention to and maintain the health status of enterprise employees from the social, physiological and psychological perspectives. Zhou & Jiang (2019) believe that "employee health management is a process of planning, organizing, directing, coordinating and controlling according to the health needs of employees, so as to achieve the goal of keeping employees' physical, mental and social life in good condition".

To sum up, the operational definition of employee health management in this study is: the whole process of detection, evaluation and intervention of employees' health assessed by measures from the aspects of management strategy, supportive environment, health education and health care services. In the enterprise, the concept of employee health management is aimed at the workplace structure, not just for individual employees. In order to improve the health status of employees and employee satisfaction, and increase the economic benefits of the enterprise, comprehensive management of employees' physical, emotional, social adaptability, mental and intellectual health is the connotation of employee health management.

2.1.4 Significance of employee health management

Hou (2019) analyzed the economic and social benefits brought by the implementation of employee health management in enterprises. From the economic aspect, employee health management can reduce the medical and health expenses of enterprises, and the indirect economic losses caused by the low work efficiency due to sick leave or illness. From the social aspect, the implementation of employee health management in enterprises can effectively solve the problem of some people seeing a doctor when needed. It is difficult and expensive to see a doctor, so reducing the pressure of national public health care and maintaining social stability is of great importance. Zhao Tianwei (), a famous Chinese nutritionist, believes that "in the short term, the health management service provided by enterprises to employees is an expenditure measure" (Zhou & Jiang, 2019). However, in the long run, it is an investment with a high rate of returning benifit, which plays a key role in the enhancement of enterprise cohesion, the improvement of labor productivity, the reduction of human resource loss and the enterprise health care expenditure. It is a very effective measure to motivate employees (Zhou & Jiang, 2019). Therefore, the intervention and control of employees' health risk can not only avoid excessive medical costs, but also improve work efficiency, so that enterprises can gain more benefits.

2.1.5 Development of employee health management

There are four stages in the development of employee health management in western countries: occupational abstinence program (1936 -1942), employee assistance program (1962 - 1980), occupational health promotion program (1980 - 1988), and employee health management plan (1988 to now). The scope of concern has expanded from the narrow sense of bad living habits to the broad sense of psychological, physical and mental health problems, from the concern for the daily health of employees to the comprehensive concern for the work, life, behavior and spirit of employees, which has expanded the scope and enriched the content. Currently, employee health management has become a comprehensive service, involving life style, mental health, mental health and mental health, career development, stress management, organizational design and management style.

Employee health management has long been popular in developed countries, but it is increasingly developing in China. The development of employee health management in China can be roughly divided into four stages: (1) before 2000 - the embryonic stage, at that time, China's health examination was not yet popular, only confined to join the army, employment and study for the purpose of special physical examination, the implementation of physical examination unit is limited to some non-profit medical institutions stipulated by the government. (2) From 2000 to 2003 featured the severe illness screening and medical security stage. After 2000, some government agencies, enterprises and institutions began to provide physical examination services for employees, taking physical examination as an additional welfare for employees. Some private enterprises also began to organize regular physical examination for employees. At this stage, the main purpose of employee welfare physical examination is to check major diseases. (3) From 2004 to 2009, during the period

of physical examination and chronic disease prevention, the outbreak of SARS enhanced the health awareness of the government, enterprises and individuals. (4) After 2010, it comes to the stage of health promotion and health management, the establishment of health management academic teams, such as Chinese preventive medicine health risk assessment and control. The professional committee, Chinese Medical Association Health Management Branch, has played an important role in improving the quality and technical level of health management practitioners and the innovation of business services.

2.2 The Theories of the Study

There are many theories related to employee health management, such as human capital theory, business ethics theory, management efficiency and management benefit theory. This independent study selects human capital theory as the conceptual framework，because the investment for the long-term development of an enterprise in the future is not limited to the material forms such as factories, machines, equipment and technological inventions, but also to a large extent expected to be effective in the development of human resources such as education, training, medical treatment, health care and community services. The former is physical capital in material form, while the latter can be summarized as human capital.

Capital originally refers to material capital (Wu, 2008). American economists maintain that "capital of American economy: its formation and financing", promoting non-material capital to the category of capital. "In order to study long-term economic growth and economic growth in different societies, the concept of capital and capital formation should be expanded, so as to include people's own investment in health, education and training." (2019) In the 17th century, the theory of human capital began to spring out. British classical political economists put forward that the difference of population quality leads to the difference of productivity they provide, which has already contained the germination of human capital thought. In the book "*Human Capital*   ", it is proposed that "human capital refers to the knowledge, ability, qualification and skill possessed by an individual, and also includes health, time and life span" (Shen, 2017).

The theory of human capital holds that health is an important part of human capital. Investment in health can not only prolong the life span of human beings, but also increase the total amount of human capital, prolong the time for human capital to play a role, and improve its capital value. Moreover, investment in healthy investment can also enhance people's physical fitness and improve their quality in all aspects. It can fully activate the individual's internal ability as well. The enterprise cannot be replaced in managing the health of employees. First, it depends on the relationship between the enterprise and the employees. According to the view of institutional economics, the enterprise has the relationship between the order and the employee. The obedience of the employees makes the enterprise influence the behavior of the employees. In order to obtain the best interests, the enterprise is unwilling to make improper actions that would possibly damage their own human capital. Therefore, enterprises will use authority to prevent unhealthy behaviors of

employees and encourage behaviors that are beneficial to the promotion of human capital. There are many examples of this kind. For instance, employees are not allowed to smoke and drink alcohol in office areas. Enterprises arrange activities regularly and provide the staff with education opportunities. Without the authority and order of the enterprise, it is difficult to carry out these health management activities outside the enterprise. Hence, enterprises can guide employees' consumption in the form of welfare. Benefits include wages and various services. In the 19th century, the practical wage system of some British companies was designed to prevent excessive consumption of alcohol and other things that could cause weakness, according to the human capital book. Nowadays, there are many kinds of welfare forms, such as vacation and leisure, shopping vouchers, service type consumer vouchers, etc. Moreover, the enterprise provides good working environment for the employees. People spend a large amount of their time in the workplace, so the health of people is directly related to the working environment, which includes the physical environment and interpersonal environment. Good working environment is of great significance to the improvement of employees' health, morale and cohesion. The working environment is non-economic welfare, and it can only be provided by the enterprise.

Therefore, enterprises should pay attention to the health of employees and implement the health management of employees, which can improve the quality of human capital to some extent and promote the development of enterprises.

2.3 Hypotheses Development

Base on the human capital theory, this research hypothesizes that health management process and health management results can affect employees' health in the enterprise, and can be used for assessment.

2.3.1 Health management process for health management

This research proposes that the health management process is the first-level evaluation index. Health management process includes health education and training, health environment management, security management, disease management, stress and emotion management, and medical insurance management (Table 2.3). These indexes will be considered as the second-level evaluation index.

A set of scientific, standardized and operable evaluation index systems of employee health management is of great significance for the diagnosis and evaluation of an enterprise's employee health management. Therefore, the research on the evaluation index system is the key to employee health management. Wang (2020) proposed that productivity, corporate image and health care should be considered in terms of the impact of employee health status on enterprise production. Among them, productivity includes the loss of working hours, work desire, physical and mental health, turnover rate; medical care includes medical claims and compensation, life, medical, and other insurance; corporate

image refers to the good reputation of an enterprise established by paying attention to the health of employees. All those mentioned indexes belong to health education and training, health environment management, security management, disease management, stress and emotion management, and medical insurance management.

2.3.2 Health management results for health management

This research also proposes that the health management result is the first-level evaluation index. Health management results include the health status of employees, the financial performance of enterprises, and the non-financial performance of enterprises (Table 2.3). These indexes will be considered as the second-level evaluation index.

Richard & Donald (1994) suggested that the health management plan of employees should include a smoking cessation plan, stress management, weight control, exercise and fitness, health risk assessment, hypertension monitoring and testing, nutrition education, back problem prevention and accident prevention plan. The integrity of the health management plan of enterprise employees can be evaluated from these above-mentioned aspects (Chang et al., 2019). All these belong to "the health status of employees", but still need to increase some index. Michael et al., divided the fields of health promotion project evaluation into the following three areas: project structure, project process and project results (Qu, 2016). Among them, the evaluation of project results should consider the cognition of health promotion project, the participation of health promotion project, the satisfaction of project, the attitude of managers, behavior change and health improvement, funds, and other aspects. No report has been discussed about the financial performance of enterprises and non-financial performance of enterprises if they can affect employees' health management. For this reason, this research used used financial performance and nonfinancial performance of enterprise to assess if they can affect enterprise employees' health management.

Table 2.1 Proposed employee' health management index

Item		Content
1	Health management process	Health education and training
		Health environment management
		Security management
		Disease management
		Stress and emotion management
		Medical insurance management
2	Health management results	Health status of employees
		Financial performance of enterprises
		Nonfinancial performance of enterprises

2.3.3 Summary sources for health management evaluation index

Based on the hypotheses for employees' health management, this study referred to Wanfang Journal Full-text Database, VIP Journal Full-text Database, CNKI database, etc., as well as Baidu academic and Yahoo search engine for literature review related to this topic in China and foreign countries. Based on the combination of resources and the previous research background related to employee health management, the evaluation index system for employee health management process and results are preliminarily formulated as Table 2.3.3. The index shows in table 2.3.3 will be considered as the third-level evaluation index.

Table 2.2 Summary sources for health management evaluation index

Items	Content	Reference
1	Diversity of health education and training forms	Xu (2021)
2	The richness of health education and training contents	Xu (2021)
3	Proportion of employees participating in health education and training	Yang et al., (2020)
4	Times of health education and training per capita in a year	Zhou (2019)
5	Qualified rate of environmental monitoring in the workplace	Shen (2017)
6	Management of smoking control in the workplace	Zhou & Jiang (2019)
7	The perfection of safety signs in the workplace	Zhou & Jiang (2019)
8	Supporting conditions of staff rest places	Zhou & Jiang (2019)
9	Number of safety management personnel	Zhou & Jiang (2019)
10	The perfection degree of safety facilities	Zhou & Jiang (2019)
11	Allocation of labor protection articles	Huang & Jin (2019)
12	Allocation of regular transport buses	Bai (2008)
13	The perfection of the staff health risk assessment system	Zhou & Jiang (2019)
14	Diversification of occupational disease prevention and control measures	Wang et al., (2017)
15	Improvement of chronic disease management system for employees	Huang, et al (2019)
16	Per capita working hours per week	Huang & Jin (2019)
17	The diversity of psychological consultation channels for employees	Huang & Jin (2019)
18	Implementation of employee assistance program	Chang et al., (2019)
19	Measurement frequency of employees' work stress	Yang et al., (2020)
20	The richness of forms of cultural and sports activities in Enterprises	Shen (2017)
21	Proportion of employees' social insurance	Bai (2008)
22	Proportion of employees' supplementary insurance	Huang & Jin (2019)
23	Proportion of employees participating in physical examination	Bai (2008)
24	Cost standard of annual welfare physical examination for employees	Lin (2020)
25	Filing rate of employee health records	Shen (2017)

26	Proportion of healthy employees undergoing physical examination	Shen (2017)
27	Absence rate of employees due to illness	Shen (2017)
28	Incidence rate of chronic diseases among employees	Zhao et al., (2017)
29	Incidence of serious injury to employees	Huang & Jin (2019)
30	Corporate image	Wang (2020)
31	Employee loyalty	Chen & Wang (2019)
32	Employee satisfaction	Chen & Wang (2019)
33	Organizational climate	Chen & Wang (2019)
34	Labor productivity per capita	Wang (2020)
35	Decrease rate of employee turnover expenses	Wang (2020)
36	Average annual reduction rate of medical and health care expenses of employees	Mao et al., (2020)
37	Return for investment	Wang (2020)

CHAPTER 3

METHODOLOGY

In order to ensure the scientific accuracy of the research, this thesis used a variety of research methods. In this chapter, research design, questionnaires for data collection, research methodology, and reliability test are described as follows.

3.1 Research Design

Through literature analysis, this study initially constructed indicators for enterprise employee health management evaluation systems. Then the questionnaires were distributed by e-mail to human resource management experts who work in the universities and enterprises. After collecting the data for the first round, those data were analysed by modified Delphi method and analytic hierarchy process. Next the modified questionnaires were given to experts who work in the universities and enterprises, and the data were analysed again. After the evaluation indicators were confirmed, the determination of weight was confirmed by the analytic hierarchy process method for those indicators. After that, two enterprises were selected for a practical test to check if the employee health management system can accurately reflect the employee health management status, and if it can e guide the enterprises to carry out employee health management activities. Figure 3.1 shows the Technology Road Map for this research.

Research question

Literature review   Index selection and weight determination

Draw up the evaluation index system

Preparation and distribution of questionnaires

Delphi method

Pass or Fail

Yes

Determination of weight by analytic hierarchy

Research on the practical application of enterprise

Research Summary
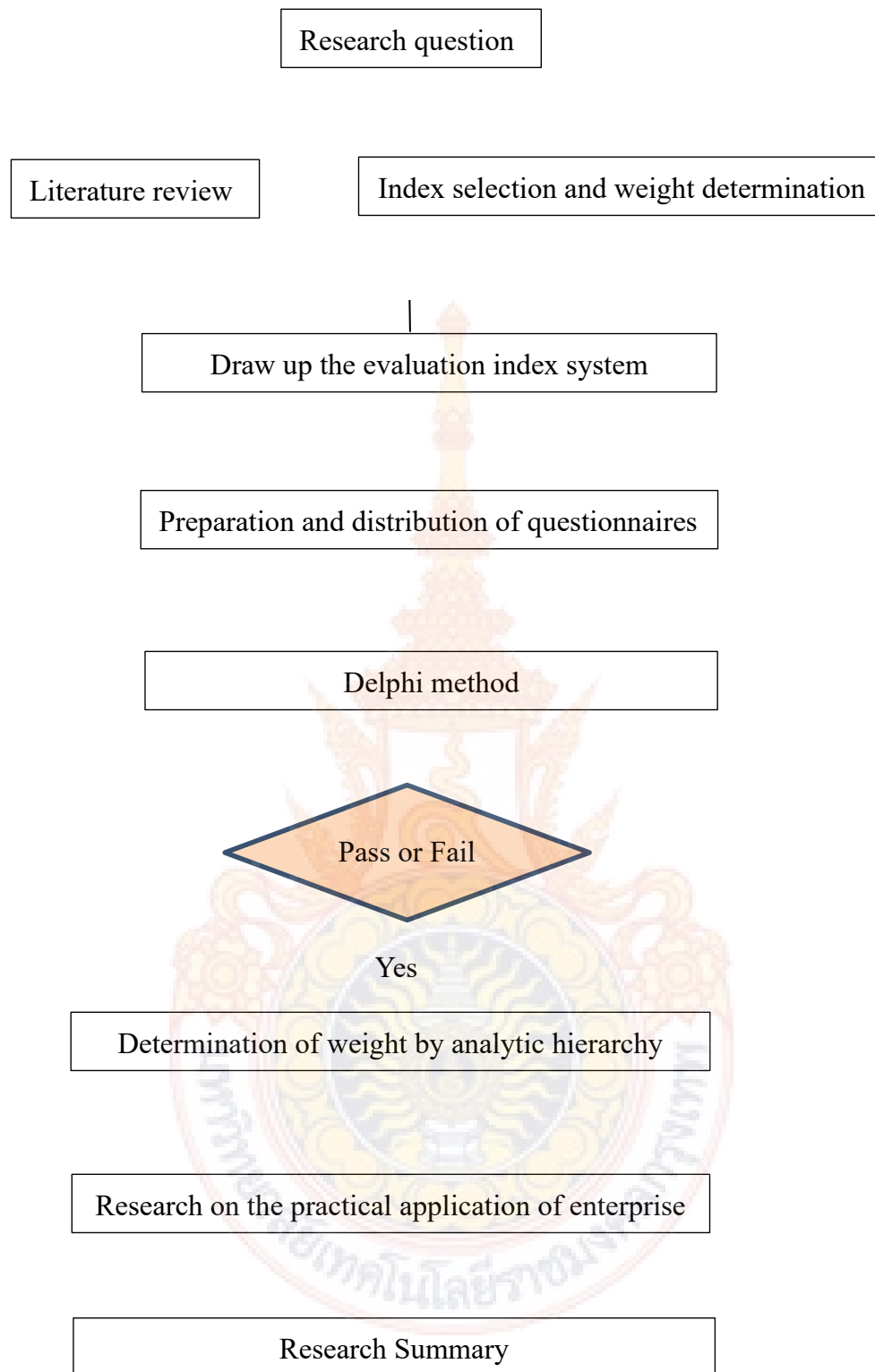
Figure 3.1   Technology Road Map

3.2 Data Collection

This study selected 30 experts who have worked for more than ten years in a relevant field, including 15 professors of human resources who work in the universities and 15 experts who work in the enterprises in China. Prior to send b the questionnaires, a call reservation was made and the participants were acknowledged that it is an independent study, and the questionnaires must be returned within two days. Questionnaires were distributed either by e-mail or face-to-face delivery. The rates of the importance of each indicator are : Very unimportant = 1 point, Unimportant = 2 points, Uncertain = 3 points, Important = 4 points and Very important = 5 points. The participants were asked to mark   "√" or "yes" on the corresponding options. The larger the number is, the more the participants agree with a particular statement.

The experts   can make suggestions on the questionnaire. A total of 30 questionnaires were distributed and returned for the first round. the recovery rate is 100%. After modifying the questionnaire, a total of 20 questionnaires was distributed randomly and 18 were returned for the second round because two   experts were absent   due to business purposes. The recovery rate is 90%. SPASS 11 software was employed to analyse   those data collected.

3.3 Research Methodology

This study used the Modified Delphi method and the Analytic hierarchy process method to calculate and analyse the data.

3.3.1 Modified delphi method

Weaver (1987) proposed that the Delphi method can be modified, and the steps and statistical methods of the traditional Delphi method can still be used, but the first round of open-ended questionnaire survey can be omitted, and the original first round of open-ended questionnaire can be replaced by the research results of relevant literature. The research framework is proposed by researchers or expert interviews, and then the structural questionnaire can be put forward as the first round of the survey. The questionnaire is called the "modified Delphi method". The modified Delphi method can not only save time, let experts focus on the problem to be studied, but also improve the questionnaire recovery rate.

3.3.1.1 Modified delphi method implementation process

In this study, the evaluation index system of employee health management is constructed by the modified Delphi method. The details are discussed in the following paragraphs.

Firstly, studying and organizing the literature is very important. After reading and sorting out a large number of works of literature, this paper initially worked out the enterprise staff health management evaluation index. According to the evaluation results, the direction of enterprise staff health management is determined to improve the level of enterprise health management. Therefore, literature research and collation is the foundation.

Secondly, selecting experts is a critical step in this study. Delphi method does not use random samples, but purposefully selects experts in a relevant field. Experts generally refer to professors in a certain research field and professionals who have worked in this field for more than 10 years. In determining the number of experts, if the number of experts is too small, the scientificity and reliability of the research can not be guaranteed. If the number of experts is too large, it is difficult to collect the data. Therefore, according to the opinion of Murphy et al., (1998), the number of experts is determined according to the scope of research problems and available resources, and 15-30 is the best.

Thirdly, distributing and collecting questionnaires plays a key role in the research. The preliminary evaluation index of enterprise employee health management is designed and distributed to the selected experts in the form of a questionnaire. The experts anonymously evaluate the index and score each index. After the experts complete the scoring, they return the questionnaire to the researcher

Fourthly, dealing with the results of the questionnaire and making necessary amendments for the main study is of great significance. The key of Delphi method is to get consistent opinions. In this study, the more commonly used statistical methods such as quartile difference, coefficient of variation, mean and Kendall harmony coefficient are selected as the test standards.

Fifthly, the amended questionnaire is distributed and collected again. After summarizing the opinions of the previous round of expert group, it will be distributed to experts again in the next round until all the specified standards are fully met.

3.3.1.2 Positive coefficient of experts for delphi method

The positive coefficient of experts refers to the recovery rate of the questionnaire, and its formula is S = S1 / S2; S is the coefficient of experts' enthusiasm; S1 refers to the number of returned questionnaires; S2 refers to the number of questionnaires distributed. The coefficient indicates the degree of interest of experts in this research.

3.3.1.3 Concentration of experts' opinions

Experts' recognition of an indicator is expressed by its arithmetic mean and standard deviation. The larger the arithmetic mean value is, the higher the importance of the index is, while the smaller the standard deviation is, the higher the concentration of experts is.

Arithmetic mean calculation formula: $M_j = \dfrac{1}{m_j} \sum\limits_{i=1}^{m} C_{ij}$

M_j : Arithmetic mean value of index evaluation

m_j : The number of experts to evaluate the indicators

C_{ij} : Expert scoring value of indicators

Standard deviation: the average distance from the mean value of all values in a set of data, which is used to measure the dispersion of data. The calculation formula is as follows.

Standard deviation calculation formula: $\sigma = \sqrt{\dfrac{1}{n} \sum\limits_{i=1}^{n} (X_i - \bar{X})^2}$

σ : Standard deviation of X_i

$\bar{X}$: Average value of X_i

n : Total number of this group

3.3.1.4 Coordination degree of expert opinions

The degree of coordination of expert opinions reflects the convergence of expert opinions. In this study, the "consistency" of expert group opinions, that is, the distribution of expert group's evaluation of various indicators is used as the judgment standard. This paper uses quartile difference, coefficient of variation and Kendall harmony coefficient to measure the "consistency" of experts' opinions.

Quartile deviation (QD) is to arrange a group of data in order of size, calculate the full distance of the data, divide the group of data into four equal parts with three points, and express the values of the three points with Q1, Q2 and Q3. Then the difference between Q3 and Q1 is the inter quartile distance, and half of the inter quartile distance is the inter quartile difference, and the calculation formula is QD = (Q3-Q1) / 2. The larger the value of the quartile difference, the greater the dispersion of the data in the middle 50%, that is, the "consistency" of the expert opinion of an indicator is poor, and vice versa. If the quartile difference of the expert group opinion distribution of an indicator is less than or equal to 0.6, it means that the expert group opinion of the indicator is highly consistent. If the quartile difference is between 0.6 and 1.0, it means that the expert group opinion of the indicator is moderately consistent. If the quartile difference is greater than 1.0, the expert group on behalf of the index does not reach an agreement. This is the criterion used in this study.

Coefficient of variation is a statistic to measure the degree of variation of each observation, which reflects the relative discrete degree of the evaluation of the importance of an indicator by the expert group, that is, the degree of coordination. The smaller the coefficient of variation is, the more unified the opinion of the expert group is, and the more convergent the questionnaire results are. The calculation formula is as follows:

$$V_j = \frac{\sigma_j}{M_j}$$

σ_j Means standard deviation of j

M_j Means average value of j

Kendall's concordance coefficient is used to judge the consistency of three or more

groups of data, which can be used to study the inter-rater reliability. The value of the coefficient is between 0 and 1. The larger the value is, the higher the degree of consistency is. The calculation method is as follows:

Firstly, Calculation of grade sum of j index

$$S_j = \sum_{i=1}^{m_j} R_{ij}$$

S_j means count number of j;

The larger the value for S_j, means the more important for the indicator.

R_{ij} means expert i, evaluation of index j

Secondly, Calculation of arithmetic mean value of index evaluation grade.

The calculation formula is: $$M_{sj} = \frac{1}{n} \sum_{j=1}^{n} S_j$$

Thirdly, Calculation the sum of the square for the difference between the index grades.

The calculation formula is: $$\sum_{j=1}^{n} d_j^2 = \sum_{j=1}^{n} (S_j - M_{sj})^2$$

Fourthly, Calculation of cooperation index. W

The calculation formula is:

$$W = \frac{12}{m^2(n^3 - n)} \sum_{j=1}^{n} d_j{}^2$$

When experts give the same evaluation to each index, we need to correct W.

T_i Means Indicates that indicators have the same level

L Means the same evaluation index of i experts in the evaluation

t_i . Represents the same number of levels in a group L

Finally, the significance test is used to judge whether the Kendall harmony coefficient meets the significance requirements.

The calculation formula is:

$$\chi_R{}^2 = \frac{1}{mn(n+1) - \frac{1}{n-1}\sum_{i=1}^{m} T_i} \sum_{j=1}^{n} d^2{}_j$$

When the significance test of Kendall coordination coefficient's ($\chi_R{}^2$), P > 0.01 or 0.05, the coordination of the evaluation of the expert group is poor, indicating that the result is not desirable.

Based on the expert group questionnaire, the average value, standard deviation, quartile deviation, coefficient of variation and harmony coefficient of each index were statistically analyzed.

Mean cut-off = mean standard minus deviation

Coefficient of variation threshold = mean plus standard deviation

The standard of quartile difference is less than or equal to 0.6.

Those whose scores are in line with the range of the threshold can be selected. If the score does not conform to the defined range of the cut-off value, it will be deleted. Considering the scientificity and comprehensiveness of the indicators, some indicators that do not fully meet the standard will not be deleted for the time being. They will be marked and modified. In the second round, they will be given to the expert group for evaluation again until the scores of each indicator meet the standard.

3.3.2 Analytic hierarchy process method

The analytic hierarchy process is a set of decision-making methods developed by Thomas, an American operations researcher and research scientist, which quantifies the qualitative analysis of the subjective judgment and numerical difference of judgment elements, and realizes the normalization and quantification of the human thinking process and subjective judgment. The basic principle is to regard the research problem as a whole system and divide the relationships among various factors by analyzing the factors within the system, then ask the experts to give quantitative scores on the importance of each factor at each level. Next a mathematical model is established to calculate and sort the relative importance of each factor at each level. Finally, the scheme is selected according to the results.

3.4 Reliability Test

After establishing the employee health management system, two enterprises were selected in the local city to test if the index system can accurately reflect the implementation of employee health management, and whether it can provide guidance for enterprises to carry out employee health management activities.

CHAPTER 4

DATA ANALYSIS

4.1 Preliminary Evaluation Index for Employee Health Management

Through literature analysis, this study initially constructed nine secondary indicators from two aspects of management process and management results, which are health education and training, health environment management, safety management, disease management, stress and emotion management, medical and insurance management, staff health status, enterprise non-financial performance and enterprise financial performance. 37 three-level indicators of enterprise employee health management evaluation index system and the specific indicators are shown in Table 4.1-1 and Table 4.1-2. The index system is designed in the form of a questionnaire (Appendix A). Before the formal distribution of the questionnaire, the scripts of individual indicators is modified to make the questionnaire of the first stage. The importance of each index was evaluated by the Likert scale (1, 2, 3, 4 and 5 represent the five degrees of "very unimportant", "unimportant", "not necessarily", "important" and "very important").

4.2 Screening Indicators by Modified Delphi Method

This study selected 30 experts who have worked for more than ten years in a relevant field to form an expert group sample, mainly including 15 professors of human resources and 15 employees engaged in enterprise human resource management. Human resources professors are from Nanjing University, Sichuan University, Chongqing University, Chengdu University and Sichuan Normal University. Three experts were selected from each university. Human resource management employees are mainly responsible for the health management of the following enterprises: Shenzhen Beike Biotechnology Co., Ltd., Chongqing Honghui Umbilical Cord.

Table 4.1 Preliminary proposed evaluation index system of employee health management----First level index for Process management

First level index	Second level index	Third level index
Process management Index	1.Health education and training	1.1 Diversity of health education and training forms
		1.2 The richness of health education and training contents
		1.3 Proportion of employees participating in health education and training
		1.4 Times of health education and training per capita in a year
	2.Health environment management	2.1 Qualified rate of environmental monitoring in workplace
		2.2 Management of smoking control in workplace
		2.3 The perfection of safety signs in the workplace
		2.4 Supporting conditions of staff rest places
	3.Security management	3.1 Number of safety management personnel
		3.2 The perfection degree of safety facilities
		3.3 Allocation of labor protection articles
		3.4 Allocation of regular transport buses
	4.Disease management	4.1 The perfection of the staff health risk assessment system
		4.2 Diversification of occupational disease prevention and control measures
		4.3 Improvement of chronic disease management system for employees
	5.Stress and emotion management	5.1 Per capita working hours per week
		5.2 The diversity of psychological consultation channels for employees
		5.3 Implementation of employee assistance program
		5.4 Measurement frequency of employees' work stress

		5.5 The richness of forms of cultural and sports activities in Enterprises
	6.Medical insurance management	6.1 Proportion of employees' social insurance
		6.2 Proportion of employees' supplementary insurance
		6.3 Proportion of employees participating in physical examination
		6.4 Cost standard of annual welfare physical examination for employees
		6.5 Filing rate of employee health records

Table 4.2 Preliminary proposed evaluation index system of employee health management----First level index for Management Results

First level index	Second level index	Third level index
Results Index	1.Health status of employees	1.1 Proportion of healthy employees undergoing physical examination
		1.2 Absence rate of employees due to illness
		1.3 Incidence rate of chronic diseases among employees
		1.4 Incidence of serious injury to employees
	2.Financial performance of enterprises	2.1 Corporate image
		2.2 Employee loyalty
		2.3 Employee satisfaction
		2.4 Organizational climate
	3.Non financial performance of enterprises	3.1 Labor productivity per capita
		3.2 Decrease rate of employee turnover expenses
		3.3 Average annual reduction rate of medical and health care expenses of employees
		3.4 Return for investment

Blood Stem Cell Center Co., Ltd., BYD Co., Ltd., General Electric (China) R & D center, and Tongwei Co., Ltd.   The questionnaires (Appendix A) were sent to the experts by e-mail or face-to-face delivery. The experts were asked to score each index, then modify the index according to the opinions of the expert group, and carry out second rounds of research repeatedly until all experts are consistent. The results are as follows:

(1) Delphi expert positive coefficient. The recovery rate of expert questionnaire = the number of expert questionnaires returned / the number of expert questionnaires issued. Two rounds of expert questionnaires were distributed in this survey. In the first round, 30 questionnaires were distributed and 30 were recovered, with a recovery rate of 100%. In the second round, 20 questionnaires were distributed and 18 were recovered, with a recovery rate of 90%. See Table 4.2-1 for details.

(2) Kendall harmony coefficient.

The two rounds of the Kendall harmony coefficient are shown in Table 4.2-2.

4.2.1 Results of the first round of expert consultation questionnaire

In the first round of expert consultation, the expert group scored each index, processed the data of the questionnaire, and the average value, standard deviation, coefficient of variation and quartile deviation of each index were obtained, as shown in Table 4.2.1-1 and Table 4.2.1-2.

Table 4.3 Statistics of Delphi experts' positive coefficient

Items	First Round	Second Round
Number of questionnaires issued	30	20
Number of questionnaires returned	30	18
Recovery rate	100%	90%

Table 4.4 Kendall harmony coefficient

Items	First Round	Second Round
Number of experts	30	20
X^2	117.43	101.11
P value	0.000	0.000
Freedom	47	44
Kendall's W	0.268	0.296

According to the results of the statistical analyse (See table 4.2.1-1 and table 4.2.1-2), the average value of all indicators is 4.075, the standard deviation is 0.185, the cut-off value = average minus standard deviation = 4.075-0.185 = 3.890; the average value of the coefficient of variation is 0.173, the standard deviation is 0.041; the cut-off value equals average plus standard deviation, that means $0.173 + 0.041 = 0.214$. All quartile difference is below 0.6, except for clause 1.1, clause 3.4, clause 5.4 and clause 2.1, so the expert opinions are highly consistent. According to the suggestions of experts from the parameter of average value, coefficient of variation and quartile difference, three unqualified indicators were eliminated in the first round, namely: "The diversification of health education and training forms", "The allocation of transportation shuttle bus", "The frequency of employees' work stress measurement". Experts suggest that the revised indicators include: "The number of health education and training per capital per year" should be changed to "the number of health education and training per capital per year", so as to better reflect the actual situation of health education and training in enterprises; "The number of safety management personnel" is too general, which should be changed to "The proportion of safety administrators in all employees"; and "The perfection degree of fire safety facilities" should also be measured. The scope of the amount is too small to comprehensively measure the situation of safety facilities, so it should be changed to" The allocation of safety facilities"; The "Employee Supplementary Insurance" includes

Table 4.5 Results of the first round of expert consultation--First level index for Management Process

Items	Average Value	Standard Deviation	Coefficient of Variation	Quartile Difference
1. **Health education and training**	4.09	0.642	0.152	0.375
1.1 Diversity of health education and training forms	3.71	0.683	0.235	0.875
1.1 The richness of health education and training contents	4.06	0.685	0.168	0.375
1.3 Proportion of participating in health education and training	3.77	0.717	0.190	0.500
1.4 Times of health education and training per capita in a year	3.76	0.551	0.148	0.000
2. **Health environment management**	4.16	0.588	0.142	0.375
2.1 Qualified rate of environmental monitoring in workplace	4.32	0.919	0.220	0.500
2.2 Management of smoking control in workplace	4.22	0.718	0.168	0.500
2.3 The perfection of safety signs in the workplace	4.03	0.758	0.186	0.375
2.4 Supporting conditions of staff rest places	4.02	0.648	0.163	0.000
3. **Security management**	4.30	0.571	0.132	0.500
3.1 Number of safety management personnel	3.70	0.734	0.197	0.000
3.2 The perfection degree of safety facilities	3.90	1.118	0.286	0.375
3.3 Allocation of labor protection articles	3.94	0.844	0.215	0.375
3.4 Allocation of regular transport buses	3.76	1.021	0.276	1.000
4. **Disease management**	4.21	0.524	0.126	0.375
4.1 The perfection of the staff health risk assessment system	4.16	0.587	0.142	0.000
4.2 Diversification of disease prevention and control measures	3.59	0.566	0.142	0.000
4.3 Improvement of chronic disease management system	3.96	0.687	0.173	0.000
5. **Stress and emotion management**	4.61	0.502	0.108	0.500
5.1 Per capita working hours per week	4.01	0.725	0.182	0.000
5.2 The diversity of psychological consultation channels	3.92	0.788	0.201	0.370
5.3 Implementation of employee assistance program	3.95	0.685	0.173	0.375

5.4 Measurement frequency of employees' work stress	4.01	0.724	0.181	0.750
5.5 The richness of cultural and sports activities in Enterprises	3.96	0.686	0.173	0.375
6. **Medical insurance management**	4.29	0.469	0.108	0.500
6.1 Proportion of employees' social insurance	4.19	0.833	0.199	0.500
6.2 Proportion of employees' supplementary insurance	3.86	0.815	0.212	0.500
6.3 Proportion of participating in physical examination	4.26	0.638	0.150	0.500
6.4 Cost standard of annual welfare physical examination	4.09	0.553	0.136	0.000
6.5 Filing rate of employee health records	4.06	0.412	0.086	0.375
Management process	4.73	0.442	0.092	0.375

Employee supplementary pension insurance and supplementary medical insurance, and the "Employee Supplementary Pension Insurance" can not distinguish the implementation of enterprise employee health management, so it is suggested to change the "Insurance proportion of Employee Supplementary Insurance" to "Employee Supplementary Insurance" . It is suggested that "Per capital labor productivity" should be changed to "Per capital-labor productivity increase range" because it is not convenient for comparison among enterprises; "Corporate image" mainly refers to the popularity, trust and reputation of enterprises, which is too wide, so it is suggested to be changed to "Corporate social reputation".

Table 4.6 Results of the first round of expert consultatio--Second level index for Management Results Index

Items	Average Value	Standard Deviation	Coefficient of Variation	Quartile Difference
1. **Health status of employees**	4.43	0.511	0.116	0.500
1.1 Proportion of healthy employees undergoing physical	4.19	0.767	0.182	0.500
1.2 Absence rate of employees due to illness	4.01	0.648	0.163	0.000
1.3 Incidence rate of chronic diseases among employees	4.06	0.758	0.188	0.375
1.4 Incidence of serious injury to employees	4.01	0.796	0.198	0.375
2. **Nonfinancial performance of enterprises**	3.99	0.698	0.185	0.500

2.1 Corporate image	3.96	0.946	0.240	0.875
2.2 Employee loyalty	4.11	0.719	0.176	0.500
2.3 Employee satisfaction	4.29	0.658	0.154	0.500
2.4 Organizational climate	4.26	0.727	0.168	0.500
3. **Financial performance of enterprises**	4.10	0.788	0.191	0.500
3.1 Labor productivity per capita	3.86	0.746	0.192	0.375
3.2 Decrease rate of employee turnover expenses	3.91	0.815	0.212	0.500
3.3 Average annual reduction rate of medical and health care	4.26	0.638	0.151	0.500
3.4 Return for investment	4.02	0.837	0.209	0.375
Management results	4.79	0.411	0.084	0.000

4.2.2 Results of the second round of expert consultation questionnaire

The second round of the expert consultation questionnaire (Appendix B) consists of two parts: (1) The scoring results of the first round of indicators and suggestions on the revision of indicators; (2) The revised indicator system. According to the situation of the first round, experts score the indicators again, and the statistical results are shown in Table 4.2.2-1 and Table 4.2.2-2.

The steps of the second round of questionnaire analyses and the criteria of data results are consistent with those of the first round. The questionnaire received feedback from 36 experts, and the positive coefficient of experts reached 90%. The statistical results demonstrate that the average value of all indicators is 4.207 and the standard deviation is 0.252. The cut-off value equals average value minus standard deviation, which means 4.207-0.252 = 3.955. The analysis shows that the values of all indexes are greater than this threshold. The average value of the coefficient of variation is 0.128; the standard deviation is 0.028; the cut-off value = average value plus standard deviation = 0.128 + 0.028 = 0.156; the coefficient of variation of each index is within this cut-off value, which meets the standard, but the difference between the coefficient of variation and the cut-off value of several indexes is less than 0.01, and the quartile difference of each index is less than 0.6, which indicates that the expert group has a high recognition of the index and has reached the "high consistency" standard. The results of the second round of the questionnaire show that Kendall's harmony coefficient has increased compared with the first round, which indicates that the expert group's judgment on the importance of indicators tends to be more consistent. The chi square test (x^2) of the coordination coefficient of the two rounds of questionnaires is 0.00, which indicates that the probability of non-accidental coordination of the expert group's opinions is high, and the reliability of the conclusion is high as well.

Table 4.7 Results of the second round of expert consultation --First level index

Items	Average Value	Standard Deviation	Coefficient of Variation	Quartile Difference
1 Management Process	4.19	0.327	0.077	0.125
1.1 Health education and training	4.27	0.460	0.109	0.500
1.1.1 Richness of health education and training contents	4.16	0.617	0.149	0.500
1.1.2 Proportion of participating in health education and training	4.10	0.472	0.113	0.000
1.1.3 Number of hours per capita health education and training	4.00	0.470	0.116	0.000
1.2 Health environment management	4.27	0.462	0.108	0.500
1.2.1 Qualified rate of environmental monitoring in workplace	4.21	0.549	0.128	0.500
1.2.2 Smoking control in workplace	4.38	0.501	0.113	0.500
1.2.3 Perfection of safety signs in the workplace	4.06	0.538	0.132	0.000
1.2.4 Supporting conditions of staff rest places	4.05	0.538	0.133	0.000
1.3 Security management	4.38	0.501	0.113	0.500
1.3.1 Proportion of security administrators in all employees	4.18	0.470	0.113	0.000
1.3.2 Allocation of safety facilities	4.21	0.427	0.102	0.125
1.3.3 Allocation of labor protection articles	4.16	0.617	0.147	0.500
1.4 Disease management	4.23	0.426	0.101	0.125
1.4.1 Perfection of the staff health risk assessment system	4.27	0.462	0.109	0.500
1.4.2 Diversification of disease prevention and control measures	4.10	0.472	0.116	0.000
1.4.3 Improvement of chronic disease management system	4.16	0.382	0.093	0.000
1.5 Stress and emotion management	4.12	0.501	0.121	0.500
1.5.1 Per capita working hours per week	4.18	0.515	0.124	0.125
1.5.2 Diversity of psychological consultation channels	4.29	0.576	0.133	0.500
1.5.3 Implementation of employee assistance program	4.12	0.472	0.116	0.000
1.5.4 Richness of cultural and sports activities in Enterprises	4.23	0.428	0.101	0.125

1.6 Medical insurance management	4.25	0.426	0.101	0.125
1.6.1 Proportion of social insurance	4.27	0.576	0.133	0.500
1.6.2 Proportion of supplementary medical insurance	4.12	0.582	0.143	0.125
1.6.3 Proportion of participating in physical examination	4.38	0.609	0.137	0.500
1.6.4 Cost standard of annual welfare physical examination	4.29	0.362	0.083	0.500
1.6.5 Ratio of employee health records	4.23	0.549	0.131	0.500

Table 4.8 Results of the second round of expert consultation--First level index for Management Results Index

Items	Average Value	Standard Deviation	Coefficient of Variation	Quartile Difference
2. **Management Results**	4.82	0.382	0.0803	0.000
2.1 Health status	4.43	0.512	0.114	0.500
2.1.1 Proportion of undergoing physical	4.38	0.662	0.152	0.500
2.1.2 Absence rate of due to illness	4.18	0.382	0.093	0.000
2.1.3 Incidence rate of chronic diseases	4.05	0.618	0.153	0.125
2.1.4 Incidence of serious injury	4.01	0.593	0.148	0.125
2.2 Non financial performance	4.03	0.601	0.149	0.000
2.2.1 Corporate social reputation	4.05	0.525	0.130	0.250
2.2.2 Employee loyalty	4.27	0.628	0.146	0.125
2.2.3 Employee satisfaction	4.32	0.593	0.138	0.500
2.2.4 Organizational climate	4.27	0.598	0.134	0.500
2.3 Financial performance	4.32	0.595	0.137	0.500
2.3.1 The increase of per capita labor productivity	3.99	0.613	0.154	0.000
2.3.2 Decrease rate of turnover expenses	4.05	0.638	0.132	0.125
2.3.3 Average annual reduction rate of medical and health care expenses	4.27	0.568	0.132	0.500
2.3.4 Return for investment	4,16	0.617	0.149	0.500

For the content validity, the preliminary formulation of the evaluation index system in this study was obtained by reading a large number of literatures, using normative analysis, semi-structured interviews and discussing with experts from the management department of the enterprises. In the process of designing the questionnaire, we invited graduate students from the department of human resource management to discuss the guidelines and items of the questionnaire in detail. The corresponding opinions and suggestions were put forward, which ensured the reliability of the index source to a certain extent. The Delphi method was used to conduct two rounds of investigation, and the opinions of 40 experts who have worked for more than five years in a relevant field were solicited to ensure the effectiveness of the index system to the greatest extent.

4.3 Weight Determination of Health Management Evaluation Index

Using the analytic hierarchy process, the hierarchical structure of enterprise employee health management evaluation is established, as shown in Figure 4.3. Using the expert survey method again, 20 index weight judgment questionnaires were issued by experts who work in the enterprises, and 18 were collected. SPASS 19 software was used for data analysis and a consistency test was applied to get the final results. Statistical results found that six questionnaires do not meet the requirements of consistency, which are unqualified questionnaires. The results of the expert group weight determination of 12 questionnaires are shown in Table 4.3-1.

The same weight is given to each expert's judgment result, and the weighted geometric average method is used to synthesize the opinions of all experts to obtain the weight result of the enterprise employee health management evaluation index system, as shown in Table 4.3-2 (Weight table of enterprise employee health management evaluation index system)
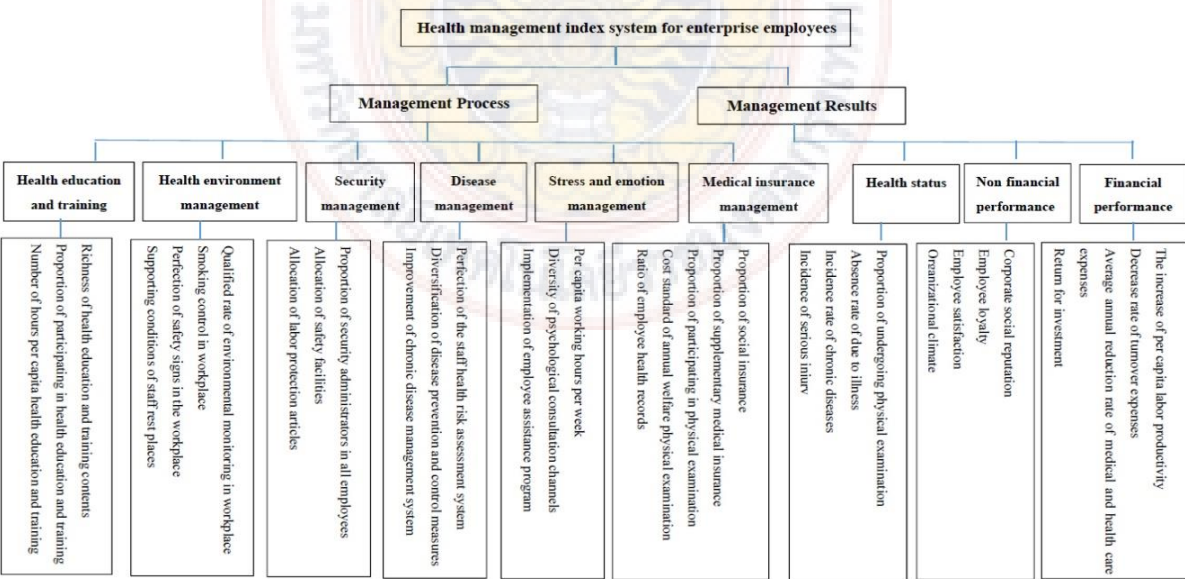

Figure 4.1 Health management index system for enterprise

Table 4.9   Experts group weight determination results

Expert / Items	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.2.4	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2
1	0.0648	0.0415	0.0263	0.0558	0.0229	0.0663	0.0217	0.0222	0.0665	0.0221	0.0085	0.0085
2	0.0531	0.0203	0.0926	0.0338	0.0240	0.0286	0.0286	0.0828	0.0276	0.0276	0.0460	0.0460
3	0.0193	0.0476	0.0078	0.0165	0.0043	0.0065	0.0095	0.0136	0.0822	0.0333	0.0083	0.0278
4	0.0072	0.0213	0.0072	0.0265	0.0049	0.0072	0.0072	0.0072	0.0072	0.0073	0.0180	0.0086
5	0.0133	0.0556	0.0302	0.0123	0.0123	0.0124	0.0124	0.0086	0.0204	0.0323	0.0295	0.0766
6	0.0266	0.0133	0.0133	0.0095	0.0105	0.0605	0.0228	0.0084	0.0246	0.0246	0.0321	0.0643
7	0.0136	0.0175	0.0108	0.0156	0.0111	0.0093	0.0093	0.0185	0.00365	0.00365	0.0103	0.0082
8	0.0413	0.0705	0.0354	0.0543	0.0800	0.0095	0.0179	0.0221	0.0138	0.0545	0.0542	0.0136
9	0.0293	0.0256	0.0112	0.0163	0.0051	0.0046	0.0105	0.0188	0.0569	0.0569	0.0151	0.0151
10	0.0273	0.0345	0.0217	0.0126	0.0051	0.00458	0.0258	0.0164	0.0165	0.0163	0.0118	0.0635
11	0.0265	0.0133	0.0265	0.0078	0.0086	0.0086	0.0190	0.0769	0.0118	0.0314	0.0451	0.0699
12	0.0111	0.0094	0.0526	0.0218	0.0058	0.0108	0.0205	0.0068	0.0202	0.0202	0.0039	0.0069
Expert / Items	1.4.3	1.5.1	1.5.2	1.5.3	1.5.4	1.6.1	1.6.2	1.6.3	1.6.4	1.6.5	2.1.1	2.1.2
1	0.0258	0.0693	0.0552	0.0298	0.0137	0.0202	0.0313	0.0388	0.0389	0.0105	0.0148	0.0148
2	0.0461	0.0176	0.0431	0.0389	0.0389	0.0141	0.0141	0.0388	0.0388	0.0328	0.0408	0.0205
3	0.0076	0.0595	0.0079	0.0136	0.0267	0.0522	0.0086	0.0298	0.0085	0.0139	0.0116	0.0087
4	0.0171	0.0299	0.0123	0.0192	0.0192	0.0052	0.0033	0.0068	0.0043	0.0057	0.0229	0.0323
5	0.0336	0.0874	0.0505	0.0788	0.0616	0.0412	0.0413	0.0412	0.0413	0.0413	0.0134	0.0256
6	0.0322	0.0391	0.0515	0.0889	0.0668	0.0232	0.0363	0.0452	0.0452	0.0122	0.0500	0.0166
7	0.0565	0.0123	0.0047	0.0146	0.0136	0.0219	0.0108	0.0166	0.0219	0.0145	0.0393	0.0962
8	0.0136	0.0455	0.0082	0.0142	0.0082	0.0401	0.0297	0.0213	0.0672	0.0698	0.0318	0.0203
9	0.0076	0.0223	0.0414	0.0982	0.0648	0.0285	0.0284	0.0853	0.0309	0.0788	0.0204	0.0203
10	0.0309	0.0366	0.0179	0.0162	0.0576	0.0189	0.0217	0.0188	0.0644	0.0218	0.0124	0.0135
11	0.0186	0.0434	0.0528	0.0832	0.0841	0.0186	0.0186	0.0473	0.0524	0.0378	0.0389	0.0176
12	0.0125	0.0139	0.0138	0.0152	0.0061	0.0068	0.0546	0.0193	0.0115	0.0068	0.0219	0.0405
Expert / Items	2.1.3	2.1.4	2.2.1	2.2.2	2.2.3	2.2.4	2.3.1	2.3.2	2.3.3	2.3.4	---	---
1	0.0148	0.0149	0.0042	0.0127	0.0128	0.0042	0.0862	0.0133	0.0308	0.0761	---	---
2	0.0288	0.0288	0.0076	0.0097	0.0032	0.0033	0.0088	0.0053	0.0041	0.0056	---	---
3	0.0528	0.0251	0.0131	0.0778	0.0266	0.0377	0.0372	0.0644	0.0764	0.0666	---	---
4	0.0136	0.0542	0.0944	0.0323	0.0603	0.0357	0.2253	0.0722	0.0346	0.0721	---	---
5	0.0078	0.0089	0.0033	0.0202	0.0202	0.0121	0.0068	0.0068	0.0068	0.0346	---	---
6	0.0168	0.0168	0.0035	0.0183	0.0183	0.0098	0.0257	0.0096	0.0201	0.0445	---	---
7	0.0435.	0.0435	0.0238	0.0488	0.0708	0.0488	0.0553	0.0243	0.0498	0.0732	---	---
8	0.0128	0.0041	0.0206	0.0145	0.0048	0.0032	0.0231	0.0193	0.0586	0.0036	---	---
9	0.0135	0.0463	0.0118	0.0169	0.0072	0.0143	0.0328	0.0172	0.0122	0.0378	---	---
10	0.0124	0.0332	0.0176	0.0212	0.0176	0.0548	0.0583	0.0362	0.0363	0.0862	---	---
11	0.0125	0.0113	0.0032	0.0146	0.0116	0.0105	0.0175	0.0072	0.0207	0.0348	---	---
12	0.0636	0.0242	0.0382	0.0934	0.0842	0.0842	0.0443	0.0315	0.0623	0.0622	---	---

4.4 Health Management Evaluation System Application

4.4.1 The qualitative indicators convert to quantitative indicators

The evaluation index system of enterprise employee health management adopts the combination of quantitative index and qualitative index. When evaluating the health management of employees in an enterprise, the quantitative indicators need not be converted. The qualitative indicators are converted into 0.2, 0.4, 0.6, 0.8,1.0 according to the scores of 1, 2, 3, 4 and 5. The overall score of each indicator is obtained according to the weight determined in Chapter 4，Table 4.3-2.

4.4.2 Health management evaluation results

In this study, we selected two enterprises, Sichuan Huahao Biotechnology Co., Ltd. and Chengdu Zhongke Meimei Medical Beauty Clinic Co., Ltd., to apply the evaluation index system of employee health management. By contacting the persons in charge of the relevant departments of the two enterprises, the health management status of the employees in the two enterprises was investigated by using the evaluation index system of employee health management constructed in this paper, and the score is shown in Table 4.4.2.

After calculation, the final scores of the two enterprises are 65.96 and 62.98. It can be seen that the health management level of employees of Chengdu Zhongke Meimei Medical Beauty Clinic Co., Ltd. is slightly lower than that of Sichuan Huahao Biotechnology Co., Ltd. In terms of health education and training, health environment management, safety management and disease management, Chengdu Zhongke Meimei Medical Beauty Clinic Co., Ltd. is lower than Sichuan Huahao Biotechnology Co., Ltd. The financial performance and non-financial performance of Chengdu Zhongke Meimei Medical Beauty Clinic Co., Ltd. are also lower than that of Sichuan Huahao Bio-

Table 4.10 Health management evaluation of employees in two enterprises

Evaluation index			Huahao	Zhongke
	1.1	1.1.1 Richness of health education and training contents	3	2
		1.1.2 Proportion of participating in health education and training	62%	52%
		1.1.3 Number of hours per capita health education and training	3	2
	1.2	1.2.1 Qualified rate of environmental monitoring in workplace	5	4
		1.2.2 Smoking control in workplace	4	5
		1.2.3 Perfection of safety signs in the workplace	5	2
		1.2.4 Supporting conditions of staff rest places	5	2
	1.3	1.3.1 Proportion of security administrators in all employees	4	5
		1.3.2 Allocation of safety facilities	5	4
		1.3.3 Allocation of labor protection articles	5	5
	1.4	1.4.1 Perfection of the staff health risk assessment system	3	2
		1.4.2 Diversification of disease prevention and control measures	1	1
		1.4.3 Improvement of chronic disease management system	3	1
	1.5	1.5.1 Per capita working hours per week	2	5
		1.5.2 Diversity of psychological consultation channels	4	4
		1.5.3 Implementation of employee assistance program	3	3
		1.5.4 Richness of cultural and sports activities in Enterprises	5	5
		1.5.4 Richness of cultural and sports activities in Enterprises	3	3
	1.6	1.6.1 Proportion of social insurance	86%	100%
		1.6.2 Proportion of supplementary medical insurance	86%	100%
		1.6.3 Proportion of participating in physical examination	91%	96%
		1.6.4 Cost standard of annual welfare physical examination	3	3
		1.6.5 Ratio of employee health records	89%	78%
	2.1	2.1.1 Proportion of undergoing physical examination	78%	76%
		2.1.2 Absence rate of due to illness	4.8%	3.8%

		2.1.3 Incidence rate of chronic diseases	8.2%	16%
		2.1.4 Incidence of serious injury	0.8%	0.3%
	2.2	2.2.1 Corporate social reputation	83%	76%
		2.2.2 Employee loyalty	75%	58%
		2.2.3 Employee satisfaction	79%	67%
		2.2.4 Organizational climate	85%	82%
	2.3	2.3.1 The increase of per capita labor productivity	41%	25%
		2.3.2 Decrease rate of turnover expenses	13%	12%
		2.3.3 Average annual reduction rate of medical and health care expenses	33%	28%
		2.3.4 Return for investment	16%	12%

Notes: 1.1:Health education and training; 1.2: Health environment management; 1.3:Security management; 1.4 : Disease management; 1.5: Stress and emotion management; 1.6: Medical insurance management; 2.1: Health status; 2.2: Non-financial performance; 2.3: Financial performance. Huahao: Sichuan Huahao Biotechnology Co., Ltd; Zhongke: Chengdu Zhongke Meimei Medical Beauty Clinic Co., Ltd.

Technology Co., Ltd. The scores of health education and training, disease management, stress and emotion management of the two enterprises are relatively low. In the interview, we learned that the content and form of health education and training of the two enterprises are relatively undiversified single, and there is a lack of experience in disease management. They only take simple measures. The overtime situation is serious, and the weekly working hours and overtime hours far exceed the national regulations, although there is a physical examination every year, the follow-up work of physical examination is weak, and the establishment of health records needs to be strengthened. The results obtained from the evaluation of the index system are consistent with the actual situation of employee health management obtained from interviews, and the effectiveness of the index system has been partially confirmed.

4.4.3 Evaluation results discuss

After the evaluation and analysis of the two enterprises by the evaluation system for enterprise, it is found that there are some common problems in employee health management. For example, although the enterprise has adopted employee health management measures, it has not carried out scientific planning, and there is no supporting investment of other material capital. The investment in health education of employees is

insufficient, and the awareness of health is not instilled into the hearts of employees. Relatively speaking, enterprises shall pay more attention to the "hard environment", but the "hard environment" only plays a fundamental role, and the "soft environment" has a greater role in promoting the health management level of employees. Generally, there is no systematic evaluation of the process and results of employee health management in enterprises. Even if there is a simple evaluation, there is no attention to the evaluation results, there is no reason to find and analyze according to the results, and there is no timely adjustment of health management policy. By using an employee's health management evaluation system for the enterprise, this study explores improvement suggestions as follows.

In the first place, it is important to develop a sound staff health management plan. Only when the health management of employees matches the material capital investment, education investment and spiritual incentive, can the comprehensive benefits of health management be realized. Enterprise employee health management is a continuous process, and its implementation effect lags behind. The investment return cycle of enterprise health management in different industries and different life cycles is also different. Therefore, enterprises should fully consider the coordination of various resources, formulate a perfect employee health management plan, and adjust strategies according to the evaluation results of each stage, so that its role can be brought into full play.

In the second place, to strengthen the health education of employees and enhance their awareness of self-health management plays significant roles in terms of the development of an enterprise. It is pointed out that the health of employees is not only affected by occupational hazards, but also by social and personal factors and the availability of health services. In addition to their own behavior and lifestyle, different employees also have different acceptance behaviors of enterprise health management. Only by making employees realize the importance of health management and consider their affordability of time, economy, psychology and fear of disease in the process of health management, instead of preferring to spend money on treatment rather than accept behavioral intervention, can health management be implemented smoothly. Enterprises should strengthen publicity and education, innovate training and education methods, choose the forms that employees like to experience , strengthen employees' understanding of health management, change "Want me to manage" to "I want to manage", and let employees take the initiative to be their own health managers.

The third suggestion is to optimize the health management environment of employees. The health management environment of enterprise employees is not only the physical environment but also the "soft environment". Relatively speaking, the "soft environment" plays a more important role in optimizing the overall environment of the enterprise. For example, communication between superiors and subordinates, corporate culture and so on has an impact on the role of health management of enterprise employees. The health habits of an employee will have an impact on the employees around him, mainly including diet, behavior habits, psychological pressure, disease prevention and control, etc. The issues of whether the interpersonal relationship within the enterprise is harmonious, whether the

health and safety culture is accepted, and whether the communication channel is smooth can affect the health behavior and work efficiency of employees, and then affect the production efficiency of the enterprise. Managers of enterprises should strengthen the construction of enterprise health culture, take measures to promote the growth of informal organizations, create a healthy atmosphere of life and work in enterprises through informal organizations, and fully activate the role of informal organizations in improving the level of employee health management.

The fourth suggestion is to collect feedback from the evaluation of the process and the results of employee health management. Enterprises should determine the evaluation cycle suitable for the health management of employees according to the specific situation. After each health management evaluation, we should analyze the problems in health management, find out the reasons and put forward countermeasures. Enterprises should also establish the feedback mechanism of evaluation, compare the results of evaluation with the data of previous years, adjust the employee health management plan for the next cycle, and determine the key points, so as to ensure that the employee health management can play the greatest role and bring the greatest value to the enterprise and employees.

CHAPTER 5

CONCLUSION

5.1 Research Summary

Based on the data analysis discussed in chapter four, the results have been shown as follows:

5.1.1 This paper defines the connotation of employee health management in enterprises. Enterprises employ measures from management strategies, supportive environment, health education, health care services and other aspects to test, evaluate and intervene the health of employees. In the enterprises, the concept of employee health management is aimed at the workplace structure, not just for individual employees. In order to improve the health status of employees, improve employee satisfaction, and increase the economic benefits of the enterprise, comprehensive management of employees' physical, emotional, social adaptability, mental and intellectual health is the connotation of employee health management.

5.1.2 The index system and method are constructed. Delphi expert method is used to select the index, and the weight of the index is determined by AHP.

5.1.3 The evaluation index system of employee health management is constructed. By using the modified Delphi method, the evaluation index system of enterprise employee health management is constructed by combining qualitative and quantitative methods, including 2 first-level indexes, 9 second-level indexes and 34 third-level indexes.

5.1.4 Through the data analysis of two enterprises, the feasibility of the health management evaluation index system is verified.

5.2 Limitations

Although the findings indicated the feasibility of the health management evaluation index system, there are still some limitations of this study regarding the research and data analysis methods and sample size.

Firstly, the research takes the Delphi method as the index selection method, and AHP as the method to determine the index weight. The coordination coefficient of experts and the consistency test results of the judgment matrix are all good, so the establishment process of the index system is reasonable. But the disadvantage is that the two methods selected are subjective methods, which is not fully in line with the ideal index system construction method combined with subjective and objective views. Therefore, if it can be combined with an objective method, the index system will be more scientific.

Secondly, this study only selected two enterprises to study the application of the index system, without a large sample test, the evaluation results are only for reference. There are differences in employee health management in different industries and types of enterprises. If we can select more different types of samples, we can make the score results of different types of enterprises in different industries into a normal distribution, so that each enterprise participating in the evaluation can understand their own level.

5.3 Research Contribution

This paper established an evaluation index system of employee health management which has been constructed by using the Delphi expert method, Quartile difference method, Kendall's concordance coefficient method, and Analytic hierarchy process method. It is the first time to use different statistical methods to determine the evaluation index, which can also be used in other fields besides employee health management. The construction of the employee health management evaluation index system improves and supplements the human capital theory of employee health management, which is a theoretical innovation.

5.4 Practical Contribution

Based on existing research, most of the researchers do not establish a practical assessment system but report some indicators. Chang et al. (2019) reported health management cognition of employees in Shanghai enterprises, which only studied health examination, health knowledge lectures, mental health management, health consultation, health records, chronic disease management and lifestyle guidance and intervention, and no systematic index was investigated . The practical test of the employee health management evaluation system was carried out by two enterprises in Chengdu, Sichuan, China, and got satisfactory results. This indicator system is a set of operation tools, which can make the enterprise know the status of employee health management more clearly, and it can be used for improving the level of employee health management.

5.5 Future Study

According to the research of this paper, the research on the evaluation index system of employee health management s prospects as follows:

(1) To strengthen the empirical research on employee health management, this study only selects two enterprises as samples for evaluation. Future research should increase the number of sample enterprises, and modify, improve and perfect the index system according to the research results. Due to the differences in employee health management between different industries, future research can be divided into different groups based on categories of industries to evaluate employee health management, analyze the differences of employee health management in different industries, and establish a more scientific and applicable evaluation index system.

(2) It is of great significance to expand the depth of research, track and record the representative enterprises, explore the investment return cycle of employee health management, make quantitative analysis on the improvement of health management and productivity, and more accurately measure the economic benefits of enterprise employee health management.

BLIBIOGRAPHY

Bai, S.Z. (2005). Preliminary consensus of Chinese experts on health management concept and discipline system. *The second annual meeting of Health Management Branch of Zhejiang Medical Association*, 141-147.

Bai, S.Z. (2008). Development opportunities and challenges of health management and related industries in China. *Chinese Journal of health management*, *2*(006), 329-332.

Chang, F.S., Gu, X.H., Zhang, X.D., Yang, Y.H., Wang, B.B, Zhou, Y.X., Deng, Y., & Lv, J. (2019). Analysis of health management cognition of employees in Shanghai enterprises. *Medicine and society*, *032*(001), 47-51. https://doi.org/DOI：10.13723/j.yxys h.2019.01.010.

Chen, J. X., & Ma, L.C. Yu, W.L., Zhou, Z.T., & Zhou, Z.K. (2006). Idea and practice of "health management". *China's public health management*, *22*(001), 7-10.

Chen, M.Z., & Wang, Y. (2019). Analysis of the cognition of health management of employees in large industrial and commercial enterprises. *Shang Xun*, *000*(010), 190-191.

Chen, Z., & Gao, Z.J. (2016). Design and implementation of personal health management system based on big data. *Digital medicine in China*, *011*(005), 64-66.

Hou, L.X. (2019). Discussion on Enterprise Management Mode and Enterprise Management Modernization. *Management and technology of small and medium sized enterprises*, *000*(007), 140-141.

Huang, J.S. (2006). Health management in USA: originated from uncontrollable growth of medical care expenditure. *Chinese Journal of health management*, *1*(1), 8-15.

Huang, Q.M., Song, W.L., & Li,C.F. (2019). Value analysis of combined detection of multiple tumor markers in physical examination. *Electronic Journal of clinical medicine literature*, *v.6;No.330*(13), 67-70.

Huang, S.Y., & Jin, Z.X. (2019). Research on overtime culture and employee health management. *Public health and Prevention, 26* (06), 107-118.

Li, R.Y. (2019). Study on the relationship between health status and working hours of employees with different genders. *Industry and Technology Forum*, *v.18*(18), 76-78.

Lin, J.J. (2020). Analysis on health management mode of sub healthy people in physical examination center of our hospital. *Journal of traditional Chinese medicine management*, *v.28，322*(15), 213-214.

Loeppke, R., Edington, D.W., & S Bég. (2010). Impact of the Prevention Plan on Employee Health Risk Reduction. *Population Health Management*, *13*(5), 275.

Mao, H., Li, J.C., Li,W., Wu, S.C.,& Wang, S.Y. (2020). Design and application of overseas employee health management platform based on Internet plus. *Environmental protection of oil and gas fields*, *v.30;No.135*(02), 47-50+68.

Murphy, M.K., Black, N.A., & Lamping, D.L.,. (1998). Consensus development methods, and their use in clinical guideline development. *Health Teelino Assess*, *2*(3), i-iv, 1-88.

Qu, H.Y., Liu, J., & Yan,S.Z. (2016). Research progress and challenges of health management. *Journal of Xiangyang Polytechnic*(15), 40-41.

Schultz, A.B., & Edington, D.W. (2007). Employee Health and Presenteeism: A Systematic Review. *Journal of Occupational Rehabilitation*, *17*(3), 547.

Shen, C.G. (2017). Human capital theory and employee health management. *Research on commercial economy*, *000*(022), 112-113.

Wang, D.S. (2020). Building high quality health management system. *Front*(7), 50-52.

Wang, F. (2012). How to standardize health management. *Chinese and foreign health Abstracts*, *09*(4), 413-414.

Wang, Y. Y., Chen,J.X, Wang H.L, Yang,G.H, Gao,Z.X, Lu,L.P，Hu,Y.K, Zhou,J, Yu, W.L, & Qian,J. (2017). Health management model blocking the natural process of chronic diseases from the source. *Public health management in China*(2), 123-127.

Wang, Z. (2020). Discussion on the strategy of health management of employees in modern enterprises. *Modern trade industry*, *41*(20), 66-67.

Weaver,S.M. (1987). From the Beginning. Using Delphi for Curriculum Development. Integrating Evaluation, Design, and Implementation. *Training & Development Journal*, *42*, 18-23.

Wei, W., & Zhao, L. (2006). Analysis of modern health management mode. *Health economy research*(5), 19.

Wu,L.X.(2007). Accelerating the academic theory research and discipline construction of health management. *Chinese Journal of health management*, *1*(001), 4-7.

Wu,L.X. (2008). Scientific evaluation and standardized management. *Chinese Journal of health management*, *002*(003), 129-131.

Wu,X. M., & Li, A.M. (2009). Current situation and thinking of health management in China. *Research on health economy*(5), 38-39.

Xie,S.S.(2020). Human genome project and medical model. *Medicine and philosophy*, *21*(9), 20-21.

Xu, Y.Y. (2021). Research on health management of enterprise employees. *Modern commerce*, (4), 58-60.

Yan, M.Q. (2006). Overview of health management. *Shanghai Nursing*(6), 72-74.

Yang, Y.Z., Yang, D.L., & Gao, M.(2020). Research on employee health management of A electrical company. *Enterprise reform and management*, *381*(16), 60-62.

Zhang, L.P., & He, J.(2018). The transformation of health management service under the concept of "great health". *Medical dietotherapy and health*, *000*(011), 146-146.

Zhao, M.H., Yan, J., Zhang, H., Huang, L.M., Zhao, H.Y., & Liang,J.(2017). The mode of health management of chronic diseases in health examination center and its effect evaluation. *Prevention and control of chronic diseases in China*, *04*(v.25;No.161), 65-68.

Zhou, L.P., & Jiang L.J. (2019). Health management of employees in overseas petroleum engineering projects. *Safety production science and technology in China*, *15*(S2), 99-102.
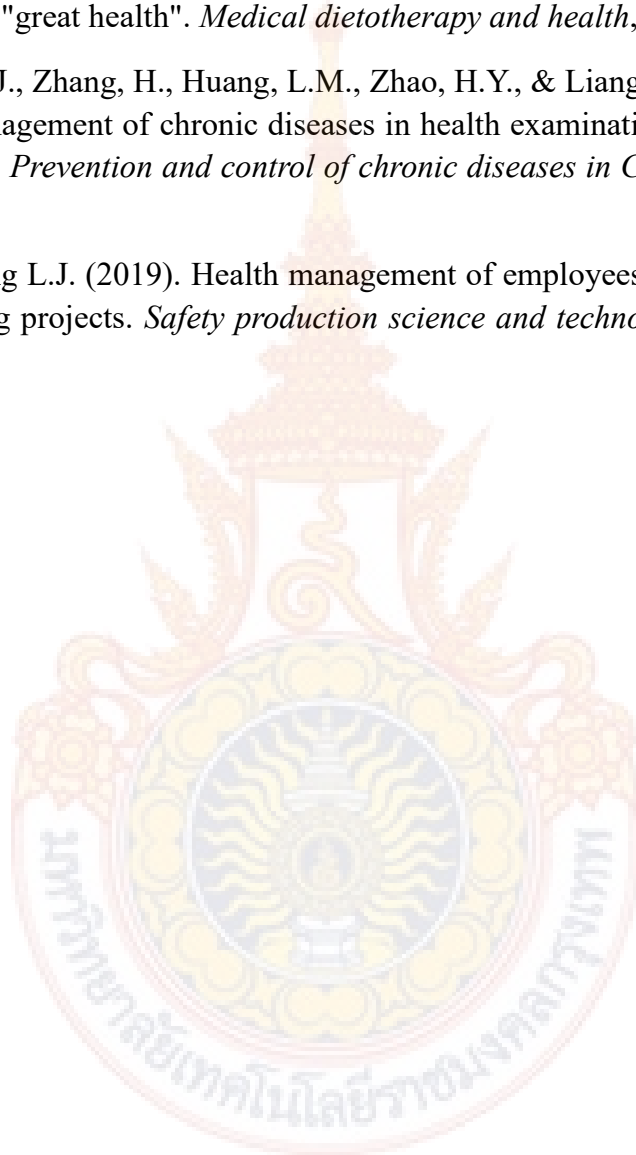
APPENDICES

QUESTIONNAIRE

Appendix   A

Health Management Index Consultation Form (First round)

Dear experts:

Hello! I am a graduate student in Business Administration of Royal Thai Polytechnic University. We are conducting a survey on the health management evaluation index system of enterprise employees. I hope you can take time out of your busy schedule to complete this questionnaire. This questionnaire is only used for my academic research. The answers are completely confidential. Please feel free to fill in this questionnaire. It will take you about a quarter of an hour to complete this questionnaire. Thank you for your support and cooperation!

If you have any questions or suggestions in the process of filling out the questionnaire, please contact Ms. Yuan Feng of Royal Thai Polytechnic University，Email：yuanfeng1984719@163.com ，We are grateful for your support!

First Part   Basic Information of Experts

1、Name：_____

2、Facility：_____

3、Email：_____

4、What work are you engaged in:_____

Second Part   Evaluation Index

Instructions:

1. Please rate the importance of each indicator. The criteria are as follows: Very unimportant = 1 point, Unimportant = 2 points, Uncertain = 3 points, Important = 4 points and Very important = 5 points. Mark "√" or "yes" on the corresponding options. The larger the number is, the more you agree with this statement.

2. You can make suggestions on the modification of the indicator setting.

A   First Level Evaluation Index

Items	1	2	3	4	5
1. Manage process					
2. Manage results					
What other indicators do you think need to be added or modified?					

B   Second Level Evaluation Index

Items	1	2	3	4	5
1.1 Health education and training					
1.2 Health environment management					
1.3 Security management					
1.4 Disease management					
1.5 Stress and emotion management					
1.6 Medical insurance management					
2.1 Health status of employees					
2.2 Financial performance of enterprises					
2.3 Non financial performance of enterprises					

What other indicators do you think need to be added or modified?					

C   Third Level Evaluation Index

Items	1	2	3	4	5
1.1.1 Diversity of health education and training forms					
1.1.2 The richness of health education and training contents					
1.1.3 Proportion of employees participating in health education and training					
1.1.4 Times of health education and training per capital in a year					
1.2.1 Qualified rate of environmental monitoring in workplace					
1.2.2 Management of smoking control in workplace					
1.2.3 The perfection of safety signs in the workplace					
1.2.4 Supporting conditions of staff rest places					
1.3.1 Number of safety management personnel					
1.3.2 The perfection degree of safety facilities					
1.3.3 Allocation of labor protection articles					
1.3.4 Allocation of regular transport buses					
1.4.1 The perfection of the staff health risk assessment system					
1.4.2 Diversification of occupational disease prevention and control measures					
1.4.3 Improvement of chronic disease management system for employees					
1.5.1 Per capita working hours per week					
1.5.2 The diversity of psychological consultation channels for employees					
1.5.3 Implementation of employee assistance program 况					
1.5.4 Measurement frequency of employees' work stress					

1.5.5 The richness of forms of cultural and sports activities in Enterprises					
1.6.1 Proportion of employees' social insurance					
1.6.2 Proportion of employees' supplementary insurance					
1.6.3 Proportion of employees participating in physical examination					
1.6.4 Cost standard of annual welfare physical examination for employees					
1.6.5 Filing rate of employee health records					
2.1.1 Proportion of healthy employees undergoing physical examination					
2.1.2 Absence rate of employees due to illness					
2.1.3 Incidence rate of chronic diseases among employees					
2.1.4 Incidence of serious injury to employees					
2.2.1 Corporate image					
2.2.2 Employee loyalty					
2.2.3 Employee satisfaction					
2.2.4 Organizational climate					
2.3.1 Labor productivity per capita					
2.3.1 Decrease rate of employee turnover expenses					
2.3.3 Average annual reduction rate of medical and health care expenses of employees					
2.3.4 Return for investment					

Appendix B

Health Management Index Consultation Form (Second round)

Dear experts

Hello! Thanks for your strong support for this topic. With your active cooperation, the first round of expert consultation has been successfully completed. Many experts have put forward constructive opinions on the design of the evaluation index system of enterprise employee health management, which plays a positive role in promoting this study. Based on the first round of statistical analysis questionnaire, the index system is adjusted properly in combination with the opinions of experts. The three indicators, namely, the diversity of health education and training forms, the degree of the allocation of the bus and the frequency of the staff working pressure measurement, are deleted. The suggested index: "the number of health education and training per capita per year" is changed to "the number of hours per capita health education and training per year". "The number of personnel in safety management" was changed to "the proportion of safety administrators to all employees"." The degree of fire safety facilities" is changed to "the level of safety facilities"." The employee supplementary insurance " was changed to "the proportion of supplementary medical insurance for employees". "The per capita labor productivity" was changed to "per capita labor productivity increase range". "The corporate image" was revised to "corporate social reputation". According to this, the second round of expert consultation questionnaire is drawn up.

Please fill in the second round of index system as required. Thank you very much for your support in your busy work. I am looking forward to your opinions and suggestions on this study. Thank you for your cooperation!

If you have any questions or suggestions in the process of filling out the questionnaire, please contact Ms. Yuan Feng of Royal Thai Polytechnic University，Email：yuanfeng1984719@163.com ，We are grateful for your support!

First Part   Basic Information of Experts

1、Name：＿＿＿＿＿＿＿＿＿＿＿＿＿

2、Facility：＿＿＿＿＿＿＿＿＿＿＿＿

3、Email：＿＿＿＿＿＿＿＿＿＿＿＿＿

4、What job are you engaged in:＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Second Part   Evaluation Index

Instructions:

1. Please rate the importance of each indicator. The criteria are as follows: Very unimportant = 1 point, Unimportant = 2 points, Uncertain = 3 points, Important = 4 points and Very important = 5 points. Mark "√" or "yes" on the corresponding options. The larger the number is, the more you agree with this statement.

2. You can make suggestions on the modification of the indicator setting.

3. MV: Mean value;   VC: Variation of Coefficient;   QD: Quartile Difference

A   First Level Evaluation Index

Items	1	2	3	4	5	MV	VC	QD
1. Manage process						4.19	0.077	0.125
2. Manage results						4.82	0.083	0.000

B   Second Level Evaluation Index

Items	1	2	3	4	5	MV	VC	QD
1.1 Health education and training						4.27	0.109	0.500
1.2 Health environment management						4.27	0.108	0.500
1.3 Security management						4.38	0.113	0.500
1.4 Disease management						4.23	0.101	0.125

Items	1	2	3	4	5	MV	VC	QD
1.5 Stress and emotion management						4.12	0.121	0.500
1.6 Medical insurance management						4.25	0.101	0.125
2.1 Health status						4.43	0.114	0.500
2.2 Non financial performance						4.03	0.149	0.000
2.3 Financial performance						4.32	0.137	0.500

C   Third Level Evaluation Index

Items	1	2	3	4	5	MV	VC	QD
1.1.1 Richness of health education and training contents						4.16	0.149	0.500
1.1.2 Proportion of participating in health education and training						4.10	0.113	0.000
1.1.3 Number of hours per capital health education and training						4.00	0.116	0.000
1.2.1 Qualified rate of environmental monitoring in workplace						4.21	0.128	0.500
1.2.2 Smoking control in workplace						4.38	0.113	0.500
1.2.3 Perfection of safety signs in the workplace						4.06	0.132	0.000
1.2.4 Supporting conditions of staff rest places						4.05	0.133	0.000
1.3.1 Proportion of security administrators in all employees						4.18	0.113	0.000
1.3.2 Allocation of safety facilities						4.21	0.102	0.125
1.3.3 Allocation of labor protection articles						4.16	0.147	0.500
1.4.1 Perfection of the staff health risk assessment system						4.27	0.109	0.500
1.4.2 Diversification of disease prevention and						4.10	0.116	0.000

control measures		5 7						
1.4.3 Improvement of chronic disease management system						4.16	0.093	0.000
1.5.1 Per capital working hours per week						4.18	0.124	0.125
1.5.2 Diversity of psychological consultation channels						4.29	0.133	0.500
1.5.3 Implementation of employee assistance program						4.12	0.116	0.000
1.5.4 Richness of cultural and sports activities in Enterprises						4.23	0.101	0.125
1.6.1 Proportion of social insurance						4.27	0.133	0.500
1.6.2 Proportion of supplementary medical insurance						4.12	0.143	0.125
1.6.3 Proportion of participating in physical examination						4.38	0.137	0.500
1.6.4 Cost standard of annual welfare physical examination						4.29	0.083	0.500
1.6.5 Ratio of employee health records						4.23	0.131	0.500
2.1.1 Proportion of undergoing physical examination						4.38	0.152	0.500
2.1.2 Absence rate of due to illness						4.18	0.093	0.000
2.1.3 Incidence rate of chronic diseases						4.05	0.153	0.125
2.1.4 Incidence of serious injury						4.01	0.148	0.125
2.2.1 Corporate social reputation						4.05	0.130	0.250
2.2.2 Employee loyalty						4.27	0.146	0.125
2.2.3 Employee satisfaction						4.32	0.138	0.500
2.2.4 Organizational climate						4.27	0.134	0.500

2.3.1 The increase of per capital labor productivity		8				3.99	0.154	0.000
2.3.2 Decrease rate of turnover expenses						4.05	0.132	0.125
2.3.3 Average annual reduction rate of medical and health care expenses						4.27	0.132	0.500
2.3.4 Return for investment						4.16	0.149	0.500

BIOGRAPHY

NAME   Yuan Feng

ACADEMIC

BACKGROUND   Year 2003-2007   Undergraduate Nan Jing University

                     Year 2018-2020   Master of Business Administration

                                          International College, Rajamangala

                                          University of Technology Krungthep

EXPERIENCES   Year 2007-2012   Jiangsu Beike Biotechnology Co., Ltd.

                     Year 2012-2017   Chengdu Qingke Biotechnology Co., Ltd.

                     Year 2017-Present   Sichuan Wuyan Biotechnology Co., Ltd.