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The Criteria of Optimal Training Cost Allocation for Sustainable Value in Aesthetic Medicine Industry

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Abstract: Medical disputes that result in medical compensation and losses affect the financial management and sustainable operational risks of enterprises. Employee training plays an important role in the sustainable growth of human resource management and also can help avoid any potential risks to enterprises' operating revenue. Based on data of a company, this study's model aims to establish a mathematical model to find the most suitable decision variables in order to provide decision-making analysis and judgment of a company's individual economic behaviors. From the second-order differential modeling method, where the functional training time of the aesthetic medicine industry (including medical errors/dispute incidences, functional training costs, and medical benefits) links to a specific functional relationship, the optimal decision-making model and evaluation criteria for the proportion of this training time under the concept of sustainable management can be constructed. The method proposed herein reduces medical errors or disputes, strengthens risk and financial management, provides customers with the best service quality, and serves as the basis for decision-making evaluation of the maximum benefits of sustainable operations.

Keywords: sustainability; risk and financial management; functional training; medical risk

1. Introduction

The sustainable operational strategy of enterprises has already become an important business concept (Shin et al. 2017). Lüdeke-Freund (2010) defined a sustainable operational business model as a "business model that creates competitive advantages through excellent customer value and contributes to the companies' sustainable development". Aesthetic medicine is a customized medical service industry (Glogau et al. 2015), the customer relationships of which are complex (Chang and Cheng 2019). Because its medical technology services are intangible (Leng et al. 2019), customers are prone to becoming uncertain and insecure about the medical procedures (Tiedtke et al. 2012), and they will intuitively choose aesthetic clinics that have excellent service quality, brand image, or reputation (Chang et al. 2018a). With the significant growth of the aesthetic surgery market, the relative demand for aesthetic medical practitioners has increased. Furthermore, medical technology, professional services, and functional training of aesthetic medical practitioners all impact the operating revenue of enterprises (Skountridaki 2017).

Medical risks and corporate risks usually correlate and affect each other. The increase in medical disputes is a serious problem for medical institutions, as they directly impact the financial management and sustainable operations of medical institutions (Chang et al. 2018b). As the relevant business operators face revenue uncertainties and fierce competition, in order to reduce their medical errors and medical losses, they invest in functional training of their human resources, resulting in increased costs and reduced profits. Under such circumstances and considering the impact of training time costs

and benefits, the criteria for a mathematical model can be used as optimal decision-making evaluation references for satisfying the maximum expected benefits of functional training time.

The novelty of this paper comes through the second-order differential model that can assist in the medical risk decision-making of the aesthetic medicine industry. First, the analysis method in this study organizes the theoretical framework of the economical or financial decision-making in a more rational, logical, and clearer manner. Second, the feasibility and applicability of the modeling demonstrates the changes in the relationship between variables and functions through sensitivity analysis. This study contributes to the existing literature in the following way. In terms of medical risks in the aesthetic medicine industry, the number of decision-making behaviors changes in order to align with the external environment of enterprise risk management uncertainties and the internal environment of financial management, thus providing reliability and validity of the model's applicability and fitness as well as rational and practical feasibility support. This study's results help owners and managers of aesthetic medicine enterprises to focus on enterprise risk management practices, financial education, and competitive strategies to achieve sustainable operations in a fierce market.

2. Literature Review

Elkington (1997) developed the triple bottom line (TBL) model and pointed out that the sustainable operations of enterprises must consider sustainable operational performance in terms of the economic, social, and environmental aspects. The sustainable operational strategy of enterprises has already become an important business concept (Shin et al. 2017), and more and more companies have incorporated sustainability into their strategic business planning and formulated sustainability policies to address these issues (Searcy 2016). The academic community has always supported the argument that enterprise risk management practices can reduce the costs associated with enterprise operations and promote competitive advantages and excellent performance (Krause and Tse 2016), which also apply to medical enterprises.

The aesthetic medicine industry is one of the most popular self-financed medical industries in the global medical market. According to the latest report from Allied Market Research, the global medical tourism market was worth nearly US\$61 billion in 2016. In addition, the total market volume is expected to reach US\$165.3 billion by 2023, Global Medical Tourism Market with a compound annual growth rate of 15% by 2018 (Chistobaev and Semenova 2018). A report by the International Society of Aesthetic Plastic Surgery (International Society of Aesthetic Plastic Surgery 2018) shows that Americans spent more than US\$16.5 billion on aesthetic and plastic surgeries and minimally invasive surgeries in 2018, which is higher than in 2017 by 4%. In 2018, there were about 500 plastic surgery clinics in Apgujeong-dong, which is called "Plastic Surgery Street" in South Korea. Plastic surgery in fact is now the main export product of South Korea (Wong 2018). Statistical data of the American Society of Aesthetic Plastic Surgery (ASAPA) in 2016 state that the aesthetic medicine industry in Brazil, France, and other countries that have developed their own aesthetic medicine industry has been relatively stable with an annual average compound growth rate of 5–10%. In Japan and South Korea, the volume of aesthetic and plastic surgeries has surged in recent years to over a 10% annual average compound growth rate. The investment costs of medical industry operators are increasing (Prajogo et al. 2018). With updated medical equipment and the progress of medical technology (Laurell 2018), Khan et al. (2016) pointed out that the aesthetic medicine industry is facing heavy competitive pressure. As the aesthetic medicine market is fiercely competitive and profits made from it are divided, it becomes a problem for aesthetic medicine business owners to obtain the maximum revenue in the face of an uncertain market environment and to help their enterprises operate sustainably.

Companies around the world are increasingly aware of the opportunities and challenges related to the economic, environmental, and social impacts of their activities. Sustainability is regarded as the core factor of a company's long-term competitiveness. With the expansion and development of the medical market, the inherent risks are also increasing; thus, corporate risk management practices have been adopted to reduce the risk of various medical disputes and help companies enhance their

sustainability abilities (Yang et al. 2018). Medical and corporate risks are often related and influence each other; thus, the increase in medical disputes is a serious problem for medical institutions and directly affects the financial management and sustainability of medical institutions (Yin et al. 2019). As plastic surgery has become a common procedure, patients have high expectations for surgery and pay great attention to safety and postoperative effects, and medical errors are one of the important reasons for the high number of incidences of plastic surgery disputes (Gong 2017). Zavala et al. (2018) indicated that medical errors or disputes occur when patients or their families are not satisfied with a medical procedure and its consequences and have disputes with doctors or other medical personnel. The definition of medical errors and the cause of injury are in relation to medical treatment, which could be avoidable adverse events. When medical disputes arise, the relative doctor–patient relationship deteriorates (Zou et al. 2018). The dissatisfaction with medical results is not the main reason for the cause of conflict between doctors and patients, but stems from the quality of the interactions between doctors and patients, as well as medical staff's professional behaviors and attitudes throughout the process (Kee et al. 2018). Cicala et al. (2017) found that medical personnel with poor professional judgment and insufficient professional skills are likely to directly lead to patient injury and death. Makary and Daniel (2016) pointed out that medical errors are the third leading cause of death in the United States. According to empirical analysis regarding the causes of medical losses, medical disputes undergoing court litigation and litigation costs account for the highest amounts; the above literature review shows that errors by medical practitioners have increased medical accident insurance premiums. As discussed above, the medical risks of losses caused by medical compensation due to medical disputes will affect a company's financial management and increase its sustainability risks.

In order to maintain market competitiveness, it is necessary to improve medical technology (Musina et al. 2016), provide excellent medical services (Garg et al. 2020), meet the medical resources required by customers (Kim et al. 2019), and attract more customers. In order to reduce operational risks, enterprises have regarded sustainable development as an important goal and launched many sustainable operational strategies, which constitute the policy of sustainable development of enterprises in the economic, social, and environmental aspects (Chang and Cheng 2019). In terms of social aspects, managers and scholars realize that functional training for employees is not only an important incentive for employees' own sustainable growth but is an important indicator to enhance competitiveness. It also strengthens the sustainable development of enterprises (Davis and Boulet 2016; Camilleri 2016; Di Vaio and Varriale 2018). Employee training is one of the main ways for enterprises to improve their core competitiveness and plays a vital role in the performance, survival, and development of enterprises (Hanaysha and Tahir 2016). Employee training helps to improve the knowledge and technology required by enterprises and improve employees' work attitude, work ability, and work results (Noe and Schmitt 1986). In terms of functional training, employee training has an effect on the sustainable development of an enterprise. Stammen et al. (2015) suggested that, in order to ensure the sustainability of medical care, medical professionals must receive functional training, which can enable them to provide higher value and cost-conscious care through applied economics. Ji et al. (2012) stated that employee training has a direct and positive impact on a company's performance in sustainable business development. From the perspective of medical businesses, functional training reflects the improvement of employees' interactions at work, their problem-solving abilities, and their openness to the concept of sustainable business development, which can incorporate a positive learning attitude into the work process (Hayden 2017).

The Ministry of Health and Welfare Taiwan (2003) issued and implemented "Measures for Practice Registration and Continuing Education of Physicians". Since then, physicians have been required to receive continuing education every 6 years and must earn more than 180 credits. From 2008, nursing personnel have been required to receive continuing education every 6 years and earn more than 150 in order to continue practicing. This shows that aesthetic medicine involves professional medical behavior. In addition to professional licenses, continuing education and functional technical training are two areas that require investment.

Certainly, the potential and value of personal expertise and the abilities of employees can be developed through functional training, which is an important link that should be valued by aesthetic medicine operators. Increasing overall competitiveness development and creating a sustainable business model have now become the decisions of aesthetic medicine practitioners for the purpose of sustainable operations that can contribute to sustainable growth in the aesthetic medicine industry (Sao Joao et al. 2019).

In order to reduce the risk of medical errors, operators invest in employee functional training, as the risk of medical errors affects the interaction of other risks, such as strategic risks, financial risks, and operational risks, which can affect the overall risk of the organization, as well as the sustainable development of the company (Liu 2019). Therefore, in financial management planning, an enterprise that invests in functional training can strengthen the functional ability of medical professionals (Senior 2017), improve the quality of professional personnel and medical quality, eliminate potential medical risks, and reduce the financial losses of the enterprise (Carver and Hipskind 2019). However, the question remains regarding the level of investment that should be made for the training time of aesthetic medicine practitioners, and whether it is sufficient to affect their corporate economic profit goals and reduce medical risks (Zendejas et al. 2013). Operating managers must consider corporate operations while working towards quality and cost-effectiveness (Ryan et al. 2014); therefore, when an operator allocates the time cost distribution of functional education and training for sustainability in the aesthetic medicine industry, the investment amount and the optimal allocation ratio to avoid and reduce costs or loss due to incidences of medical errors/disputes should both be considered. Thus, the evaluation and analysis of decision-making under the maximization of net revenue is the focus of this study.

3. Model Formulation

3.1. Research Method

This study adopts second-order differential model analysis to construct the research model. This form of analysis refers to using the derivations of mathematical symbols and numerical calculations to study and represent economic or financial decision-making processes and phenomena via economic or financial decision analysis. These methods are not only simple tools for application purposes, but also contain many important theoretical concepts related to numerical methods. The optimization model based on differential equations has been applied to sustainable enterprise management (Biswas et al. 2017), the creation of competitive advantages through sustainable environmental management and green entrepreneurship (Skordoulis et al. 2017), the optimal control of sustainable development in bioremediation (Nikitina et al. 2017), advertising costs (Chalikias et al. 2016), and the sustainability of cooperative epidemiological models (Barrios et al. 2018). Second-order differential model analysis helps organize the theoretical framework of economical or financial decision-making in a more rational, logical, and clearer manner. Albersa et al. (2015) proposed the use of optimization and decision models to guide sales personnel to make significant progress and explored the key concepts regarding sales response function estimation and heuristic solutions, as enterprise risk management in sustainability affects the company's cash flow and income and reduces the company's capital costs (Berry-Stölzle and Xu 2018). In the assessment of risk and financial management, the most suitable training time cost allocation ratio should be invested, in order to reduce the costs or losses derived from the incidences of medical errors/disputes. Satisfying the industry's overall maximum return through economic management is the main factor in constructing the sustainability model. When the operating managers of the chain aesthetic medicine industry of this study are making investments regarding the time of functional education for employees of two subsidiaries, according to the assessment of the company's sustainability and financial risk management, they should use the most suitable training time cost allocation ratio to reduce the costs and losses derived from the incidence rate of medical errors/disputes. In this case, the following second-order differential equations can be used to analyze the proportion of

functional training time of the two companies. The main factor for the construction of this model is to achieve the overall maximum profit through economic management under sustainability.

When faced with intense market competition, Aesthetic Medicine Group A set up two aesthetic clinics that have different business focuses, with the aim to achieve sustainable development and increase its market share and brand awareness.

Subsidiary 1 is an aesthetics medical institution with high pricing and focus on plastic surgery and microplastic surgery, which includes highly invasive medical treatments and long recovery periods. As both the appearance and posture of patients are greatly and permanently changed, Subsidiary 1 belongs to the medical industry of high risk and high unit price, and its medical professionals include licensed doctors and anesthesiologists, nursing staff, and medical beauticians. Doctors who perform plastic surgery must have many years of training in hospitals that specialize in aesthetic surgery. In addition to being qualified as a doctor, operating physicians must have specialty doctor licenses, such as a plastic surgeon license, while their nursing staff must have relevant training and experience to work in an operating room. As such functional skills require extensive training, meaning longer training time and higher cost, the investment threshold for setting up an orthopedic surgery institution is very high.

Subsidiary 2 is a microplastic surgery medical unit, which is characterized by no obvious wounds, short recovery period, and low cost and thus is easily accepted by the general public. Due to the short-term effect of microplastic surgery, frequent operation is needed to maintain the effect. Microplastic surgery is a medical industry with low investment cost, low risk, and low unit price, and its medical professionals and personnel only require a medical background and medical license. As the physicians perform micro-plastic surgery services through the training of medical equipment operation and injection techniques, there is no restriction on the licensing requirements of specialist physicians for the implementation of micro-plastic surgery; thus, skill training time is shorter. There are many training types, and training investment costs are lower.

3.2. Model Explanations

The main assumptions for the construction of this model are based on the following:
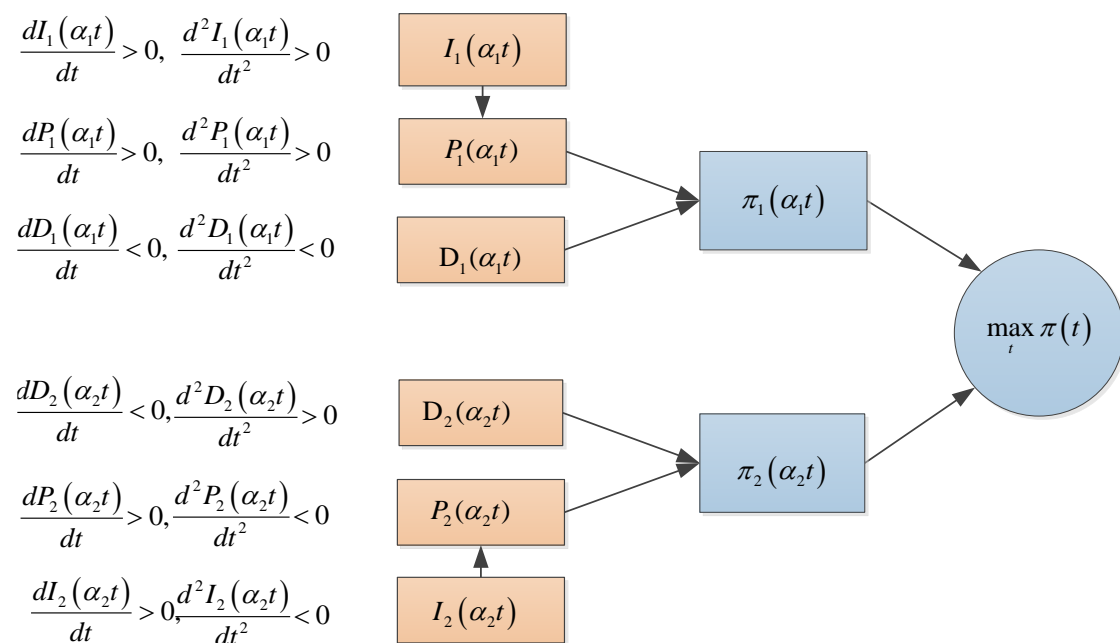
The investment of time in functional training and the incidence of medical errors or disputes of aesthetic medicine operators under sustainability are negatively correlated. In other words, the incidences of medical errors/disputes can be appropriately reduced when the optimal functional training investment of time is made. (1) The greater the optimal functional training investment of time, the more the training cost will increase. (2) Medical errors or disputes have a direct negative impact on the earnings of aesthetic medicine operators. (3) In the event of medical errors or disputes, the operators suffer direct medical losses that affect sustainability. However, the factors that affect net income $\max_{t} \pi(t)$ of aesthetic medicine under sustainability are the time invested in functional training t and training cost $I_i(\alpha_i t)$ of the employees of Subsidiary 1 i_1 and Subsidiary 2 i_2 by the head office, where α_1 and α_2 are the ratio of time allocated to Subsidiaries 1 and 2, respectively.

When medical loss $D_i(\alpha_i t)$ is caused by a medical error or dispute, $D_1(\alpha_1 t)$, $D_2(\alpha_2 t)$ are the medical compensation losses of Subsidiaries 1 and 2 due to medical errors, and such medical losses also directly affect the operating income of aesthetic medicine $P_i(\alpha_i t)$ under sustainability. $P_1(\alpha_1 t)$ and $P_2(\alpha_2 t)$ are the operating incomes of Subsidiaries 1 and 2, respectively, while $\pi_1(\alpha_1 t)$ and $\pi_2(\alpha_2 t)$ are the net incomes of Subsidiaries 1 and 2, respectively.

This study assumes that training cost allocation ratio $I_i(\alpha_i t)$ and time t of the optimal aesthetic medical professional functional training under sustainability also directly affects the professional judgment of the aesthetic medical professional, which can reduce medical errors or disputes and thus reduce corporate risk. Assuming that the professionals' training knowledge in the aesthetic medicine industry is insufficient, and results in litigation caused by medical errors or high dispute rates, if reported through the media and passed on by customers, such negative exposure will inevitably

affect revenues. In other words, the company will fail to reach the final goal of net income $\max_t \pi(t)$, which affects sustainable development.

The assumption that medical professionals are given more training time can reduce medical errors and disputes $P_i(\alpha_i t)$ and avoid litigation, which is relatively helpful to the net incomes $\pi_1(\alpha_1 t)$ and $\pi_2(\alpha_2 t)$ of the two subsidiary companies under the sustainability of the aesthetic medicine industry. On the contrary, if the aesthetic medical professionals of Subsidiaries 1 and 2 often cause medical errors and disputes $D_i(\alpha_i t)$, which result in litigation and compensation due to inadequate training time, in turn, this will inevitably affect the company's reputation, leading to a decline in performance, or even making the company go out of business or undergo bankruptcy. The interactive parameters between the two are ultimately significantly related to the net income $\max_t \pi(t)$ of the aesthetic medicine industry under sustainability. The framework of optimal decision making for aesthetic medical functional training time is shown in Figure 1.

$$\frac{dI_1(\alpha_1 t)}{dt} > 0, \quad \frac{d^2 I_1(\alpha_1 t)}{dt^2} > 0$$

$$\frac{dP_1(\alpha_1 t)}{dt} > 0, \quad \frac{d^2 P_1(\alpha_1 t)}{dt^2} > 0$$

$$\frac{dD_1(\alpha_1 t)}{dt} < 0, \quad \frac{d^2 D_1(\alpha_1 t)}{dt^2} < 0$$

$$\frac{dD_2(\alpha_2 t)}{dt} < 0, \quad \frac{d^2 D_2(\alpha_2 t)}{dt^2} > 0$$

$$\frac{dP_2(\alpha_2 t)}{dt} > 0, \quad \frac{d^2 P_2(\alpha_2 t)}{dt^2} < 0$$

$$\frac{dI_2(\alpha_2 t)}{dt} > 0, \quad \frac{d^2 I_2(\alpha_2 t)}{dt^2} < 0$$

Figure 1. Optimal decision-making evaluation framework for aesthetic medical functional training investment of time.

This model is based on the aforementioned assumptions, and the relevant parameter symbols are explained in Table 1.

Table 1. Parameter symbol definition.

Parameter	Definition
i	Subsidiaries 1 and 2.
α_1, α_2	The proportion of training time allocated to Subsidiaries 1 and 2.
t	Total time spent on aesthetic medicine functional training under sustainability.
t_1, t_2	Training time of Subsidiaries 1 and 2 under sustainability.
$I_i(\alpha_i t)$	Aesthetic medicine functional training time of Subsidiary 1/Subsidiary 2 under sustainability.
$P_i(\alpha_i t)$	Operating income of Subsidiary 1/Subsidiary 2 with aesthetic medicine functional training under sustainability.
$D_i(\alpha_i t)$	Compensation costs due to medical errors of Subsidiary 1/Subsidiary 2 with functional training under sustainability.

The relevant functions and parameter symbols are assumed as follows: 1. Assumption of Subsidiaries 1 and 2 aesthetic medicine functional training investment time cost $I_i(\alpha_i t)$, the cost–benefit function:

$$I_i(\alpha_i t) = a_i + b_i \times (\alpha_i t) + c_i \times (\alpha_i t)^2, i = 1, 2, t > 0, a_i, b_i, c_i,$$

Cost and benefit relationship between the time cost invested in aesthetic medicine functional training allocation $I_1(\alpha_1 t)$ by Subsidiary 1, and the time invested in aesthetic medicine functional training t: $\frac{dI_1(\alpha_1 t)}{dt} > 0$, $\frac{d^2 I_1(\alpha_1 t)}{dt^2} > 0$, if $t > 0$, $c_1 > 0$ and $b_1 > -2c_1\alpha_1 t$ ($b_1 >$ a certain negative number)

Assume:

$$I_1(\alpha_1 t) = a_1 + b_1(\alpha_1 t) + c_1(\alpha_1 t)^2 > 0 \tag{1}$$

where the parameters meet the conditions of $a_1 > c_1(\alpha_1 t)^2$, $b_1 > -2c_1(\alpha_1 t)$, $c_1 > 0$, $t > 0$ and satisfy the first-order differential greater than 0. Thus,

$$\frac{dI_1(\alpha_1 t)}{dt} = \alpha_1(b_1 + 2c_1(\alpha_1 t)) > 0,$$

To satisfy the second-order differential greater than 0, the cost–benefit of Subsidiary 1's aesthetic medicine functional training investment of time at this stage is calculated:

$$\frac{d^2 I_1(\alpha_1 t)}{dt^2} = 2c_1\alpha_1^2 > 0$$

The cost–benefit relationship between the time cost invested in aesthetic medicine functional training allocation $I_2(\alpha_2 t)$ by Subsidiary 2 and the time invested in aesthetic medicine functional training t: $\frac{dI_2(\alpha_2 t)}{dt} > 0$, $\frac{d^2 I_2(\alpha_2 t)}{dt^2} < 0$ if $t > 0$ $c_2 < 0$ and $b_2 > -2c_2(\alpha_2 t) > 0$.

Assume:

$$I_2(\alpha_2 t) = a_2 + b_2(\alpha_2 t) + c_2(\alpha_2 t)^2 > 0 \tag{2}$$

where the parameters meet the conditions of $a_2 > c_2(\alpha_2 t)^2$, $b_2 > -2c_2(\alpha_2 t) > 0$, $c_2 < 0$, $t > 0$, satisfy the first-order differential greater than 0. Thus,

$$\frac{dI_2(\alpha_2 t)}{dt} = \alpha_2(b_2 + 2c_2(\alpha_2 t)) > 0$$

To satisfy that the second-order differential is less than 0 and calculate the cost–benefit of Subsidiary 2's optimal aesthetic medical functional training investment of time at this stage:

$$\frac{d^2 I_2(\alpha_2 t)}{dt^2} = 2c_2\alpha_2^2 < 0$$

Assumption of the cost–benefit relationship function of the operating income $P_i(\alpha_i t)$ of Subsidiaries 1 and 2 and their functional training allocation investment time t:

$$P_i(\alpha_i t) = a_{p_i} - b_{p_i}(\alpha_i t)^{-1} - c_{p_i}(\alpha_i t)^{-2} \quad i = 1, 2 \quad a_{p_i} \quad b_{p_i} \quad c_{p_i}$$

The cost–benefit relationship between operating income $P_1(\alpha_1 t)$ of the aesthetic medicine of Subsidiary 1 and its time invested in the allocation of functional training t:

$$\frac{dP_1(\alpha_1 t)}{dt} > 0, \frac{d^2 P_1(\alpha_1 t)}{dt^2} > 0$$

Assume:

$$P_1(\alpha_1 t) = a_{p_1} - b_{p_1}(\alpha_1 t)^{-1} - c_{p_1}(\alpha_1 t)^{-2} > 0 \tag{3}$$

where the parameters meet the conditions of $a_{p_1} > b_{p_1}(\alpha_1 t)$, $b_{p_1} > 0$, $c_{p_1} > 0$ and satisfy the first-order differential greater than 0. Thus,

$$\frac{dP_1(\alpha_1 t)}{dt} = (\alpha_1 t)^{-3}\alpha_1\left(b_{p_1}(\alpha_1 t) + 2c_{p_1}\right) > 0$$

To satisfy that the second-order differential is greater than 0, $b_{p_1} > 0$ and $a_{p_1} > b_{p_1}(\alpha_1 t) > 0$; the cost–benefit relationship between the time invested in the allocation of functional training t of Subsidiary 1 and its operating income $P_1(\alpha_1 t)$ is calculated:

$$\frac{d^2 P_1(\alpha_1 t)}{dt^2} = \alpha_1^2 b_{p_1}(\alpha_1 t)^{-3} - 3\alpha_1\left(b_{p_1}(\alpha_1 t) + 2c_{p_1}\right)(\alpha_1 t)^{-4} > 0$$

The cost–benefit relationship between operating income $P_2(\alpha_2 t)$ of the aesthetic medicine of Subsidiary 2 and the time invested in the allocation of functional training t:

$$\frac{dP_2(\alpha_2 t)}{dt} > 0, \frac{d^2 P_2(\alpha_2 t)}{dt^2} < 0$$

Assume:

$$P_2(\alpha_2 t) = a_{p_2} - b_{p_2}(\alpha_2 t)^{-1} - c_{p_2}(\alpha_2 t)^{-2} > 0 \tag{4}$$

where the parameters meet the conditions of $a_{p_2} > 0$, $b_{p_2}(\alpha_2 t)^{-1} < a_{p_2}(\alpha_2 t)$ and $c_{p_2} < 0$, and satisfy the first-order differential greater than 0. Thus,

$$\frac{dP_2(\alpha_2 t)}{dt} = (\alpha_2 t)^{-3}\alpha_2\left(b_{p_2}(\alpha_2 t) + 2c_{p_2}\right) > 0$$

To satisfy that the second-order differential is less than 0, $c_{p_2} < \alpha_2^2 b_{p_2}(\alpha_2 t)$ and $b_{p_2} < 0$, $c_{p_2} < 0$, the cost–benefit relationship between the optimal time invested in the allocation of functional training t of Subsidiary 2 and its operating income $P_2(\alpha_2 t)$ is calculated:

$$\frac{d^2 P_2(\alpha_2 t)}{dt^2} = \alpha_2^2 b_{p_2}(\alpha_2 t)^{-3} - 3\alpha_2\left(b_{p_2}(\alpha_2 t) + 2c_{p_2}\right)(\alpha_2 t)^{-4} < 0$$

Assumption of the cost–benefit relationship between the cost of medical losses due to medical errors $D_i(\alpha_i t)$ of Subsidiaries 1 and 2 and their time invested in the allocation of functional training t:

$$D_i(\alpha_i t) = a_{d_i} + b_{d_i}e^{c_{d_i} \times f(\alpha_i t)} \text{ makes } f(\alpha_1 t) = (\alpha_1 t)^{-1}$$

Assumption of the cost–benefit relationship between the cost of medical losses due to medical errors $D_1(\alpha_1 t)$ of Subsidiary 1 and its time invested in the allocation of functional training t:

$$\frac{dD_1(\alpha_1 t)}{dt} < 0, \frac{d^2 D_1(\alpha_1 t)}{dt^2} < 0$$

Assume:

$$D_1(\alpha_1 t) = a_{d_1} + b_{d_1}e^{c_{d_1}(\alpha_1 t)^{-1}} < 0 \tag{5}$$

where the parameter satisfies the condition of $a_{d_1} > -b_{d_1}e^{-2}$, $c_{d_1} < -2\alpha_1 t$, $b_{d_1} \times c_{d_1} > 0$ satisfy the first-order differential less than 0. Thus,

$$\frac{dD_1(\alpha_1 t)}{dt} = b_{d_1} \times + c_{d_1}e^{c_{d_1} \times f(\alpha_1 t)} < 0$$

To satisfy that the second-order differential is less than 0, $c_{d_1} + 2\alpha_1 t < 0$, the cost–benefit relationship between the cost of medical losses due to medical errors $D_1(\alpha_1 t)$ of Subsidiary 1 and its time invested in the allocation of functional training t is calculated:

$$\frac{d^2 D_1(\alpha_1 t)}{dt^2} = b_{d_1} \times c_{d_1} e^{c_{d_1}(\alpha_1 t)^{-1}} \times t^{-4}(c_{d_1} + 2\alpha_1 t) < 0$$

Assumption of the cost–benefit relationship between the cost of medical losses due to medical errors $D_2(\alpha_2 t)$ of Subsidiary 2 and its time invested in the allocation of functional training t:

$$\frac{dD_2(\alpha_2 t)}{dt} < 0, \frac{d^2 D_2(\alpha_2 t)}{dt^2} > 0$$

Assume:

$$D_2(\alpha_2 t) = a_{d_2} + b_{d_2} e^{c_{d_2}(\alpha_2 t)^{-1}} > 0 \tag{6}$$

where the parameter satisfies the condition of $a_{d_2} > -b_{d_2} e^{-2}$, $b_{d_2} \times c_{d_2} > 0$, $c_{d_2} > -2\alpha_2 t$ satisfy the first-order differential less than 0. Thus,

$$\frac{dD_2(\alpha_2 t)}{dt} = b_{d_2} \times c_{d_2} e^{c_{d_2} \times f(\alpha_2 t)} \times \frac{df(\alpha_2 t)}{dt} < 0$$

To satisfy the second-order differential is less than 0, $c_{d_2} + 2\alpha_2 t < 0$, the cost–benefit relationship between the cost of medical losses due to medical errors $D_2(\alpha_2 t)$ of Subsidiary 2 and its time invested in the allocation of functional training t is calculated:

$$\frac{d^2 D_2(\alpha_2 t)}{dt^2} = b_{d_2} \times c_{d_2}{}^2 e^{c_{d_2}(\alpha_2 t)^{-1}}\left(-\alpha_2 t^{-2}\right) + b_{d_2} \times e^{c_{d_2}(\alpha_2 t)^{-1}} 2\alpha_2 t^{-3} > 0$$

The objective function is to satisfy the following instructions:
$\alpha_1 + \alpha_2 = 1 \alpha_1, \alpha_2 \geq 0$, and given α_1, α_2

$$\begin{aligned}
\max_t \pi(t) &= \max_t \sum_{i=1}^{2} \pi_i(\alpha_i t) \\
&= \max_t \{\pi_1(\alpha_1 t) + \pi_2(\alpha_2 t)\} \\
&= \max_t \{P_1(\alpha_1 t) - I_1(\alpha_1 t) - D_1(\alpha_1 t) + P_2(\alpha_2 t) - I_2(\alpha_2 t) - D_2(\alpha_2 t)\}
\end{aligned}$$

The cost–benefit of optimal time invested in the allocation of functional training t^* meets the maximum benefit $\pi(t^*)$:

$$\pi(t) = P_1(\alpha_1 t) - I_1(\alpha_1 t) - D_1(\alpha_1 t) + P_2(\alpha_2 t) - I_2(\alpha_2 t) - D_2(\alpha_2 t)$$

That is, to determine the optimal time invested in the allocation of functional training t^* while satisfying $\frac{d\pi(t)}{dt} = 0$ and $\frac{d^2\pi(t)}{dt^2} < 0$.

Extremum first-order condition necessary condition: $\frac{d\pi(t)}{dt} = 0$; therefore,

$$\frac{d\pi(t)}{dt} = \sum_{i=1}^{2}\left(\alpha_i b_{p_i}(\alpha_i t)^2 + 2\alpha_i c_{p_i}(d_i t)^{-3} - \sum_{i=1}^{2}\left(\alpha_i b_i + 2\alpha_i c_i(d_i t) - \alpha_i(\alpha_i t)^{-2} b_{d_i} - c_{d_i} e^{c_{d_1}(\alpha_1 t)^{-1}}\right)\right) \tag{7}$$

In other words, the optimal time invested in the allocation of functional training t^* to satisfy

$$
\begin{aligned}
\frac{d\pi(t)}{dt} = &\ b_{p_1}(\alpha_1 t)^{-2}\alpha_1 + b_{p_2}(\alpha_2 t)^{-2}\alpha_2 + 2c_{p_1}(\alpha_1 t)^{-3}\alpha_1 + 2c_{p_2}(\alpha_2 t)^{-3}\alpha_2 \\
&- (b_1\alpha_1 + b_2\alpha_2 + 2c_1(\alpha t) + 2c_2(\alpha_2 t)\alpha_2) \\
&- b_{d_1}c_{d_1}e^{c_{d_1}(\alpha_1 t)^{-1}}(\alpha_1 t)^{-2}\alpha_1 - b_{d_2}c_{d_2}e^{c_{d_2}(\alpha_2 t)^{-1}}(\alpha_2 t)^{-2}\alpha_2 = 0
\end{aligned}
\tag{8}
$$

Extremum second-order sufficient condition $\frac{d^2\pi(t)}{dt^2} < 0$

$$
\begin{aligned}
\frac{d^2\pi(t)}{dt^2} = &\ \sum_{i=1}^{2}\left[-2\alpha^2{}_i b_{p_i}(\alpha_i t)^{-3} - 6\alpha_i{}^2 c_{p_i}(\alpha_i t)^{-4}\right] \\
&- \sum_{i=1}^{2}\left[2\alpha_i^2 c_i + 2\alpha_i^2(\alpha_i t)^{-3}b_{di} - c_{di}e^{c_{di}(\alpha_1 t)-1} + \alpha_i^2(\alpha_i t)^{-4}b_{d_i}c_{d_i}{}^2 e^{c_{d_i}(\alpha_i t)^{-1}}\right] < 0
\end{aligned}
\tag{9}
$$

4. Numerical Example[1]

4.1. Introduction of Model Value Examples

Aesthetic Medicine Group A has an annual training budget for employee training and functional education, while its two subsidiaries have different operating patterns. The human resources department provides functional education and training with different training time cost allocation ratios and different times of investment for different medical execution services, in order to reduce medical errors and medical losses. Specific risk management tools are expected to establish good medical service quality and reputation to reduce the company's capital costs.

Subsidiary 1 operates the plastic aesthetic medicine business, which is characterized by invasive plastic surgery with high investment, high risk, and high unit price. The development of each surgical medical technology requires a long time and then requires more time for the learning and training of new surgery processes. Practitioners must be familiar with the surgeries and implementation of their procedures. Thus, when there is a medical error leading to compensation, the amount is relatively high, and its impact on revenue is great. Therefore, although there are fewer functional training sessions, the training time for Subsidiary 1 is longer and the cost of training time is higher.

Subsidiary 2 operates skincare aesthetic service, meaning it is a micro-plastic surgery business with low investment, low risk, low unit price, and low return. As laser operations are easier to perform, the required operation items are only a micro-plastic laser and the injection items. The instrument manufacturers provide assistance in laser operation. Moreover, injections are simply taught by agents or experienced physicians in class, while there are many training items for new medical technologies, such as new lasers, new injections, and other micro-plastic medical services. The training time is shorter, meaning staff can easily learn and quickly implement the required items. If a medical error occurs, due to the low revenue income, a relatively low compensation amount is involved. The above shows that training time for Subsidiary 2 is shorter, there are more training items, and the time and cost investment is lower.

In the case of the training cost of medical technology, the surgical technology training cost of physicians is about NT$100,000 to NT$200,000 per person per time, which does not include accommodation or transportation costs. One training call is sometimes not enough when multiple training instructions are required. In terms of micro-plastic surgeries, the training cost of medical technology, medical equipment, and new injection needle training is about NT$10,000–20,000 per person per time. In addition, the functional training courses for medical professionals and medical administrative personnel are NT$600–2000 per person per time. Each training takes about 2–8 h, and

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[1] The currency of this article is New Taiwan dollar (NT$); per US$ exchange rate is around NT$30.

the number of courses depends on the funding investment of the company for on-the-job education. These relevant parameter data settings are based on examples provided by owners in the aesthetic medicine industry. Data assumption: in the simulation analysis, the assumed correlation parameters required for the model are shown in the Table 2.

Table 2. Basic assumption of the parameters.

Parameters	Assigned Values	Parameters	Assigned Values
a_{I_1}	$150,000	a_{I_2}	$10,000
b_{I_1}	$20,000	b_{I_2}	$2,000
c_{I_1}	$500	c_{I_2}	$100
a_{P_1}	$25,290,000	a_{P_2}	$80,000
b_{P_1}	$8,000,000	b_{P_1}	$5,000,000
c_{P_1}	$5,000,000	c_{P_1}	$3,000,000
a_{d_1}	$300,000	a_{d_1}	$200,000
b_{d_1}	$100,000	b_{d_1}	$50,000
c_{d_1}	$6000	c_{d_1}	$5000
α	50%	t	60 h

4.2. Sensitivity Analysis

This study applied a practical mathematical model to import numerical examples. In the sensitivity analysis, according to the numerical examples of Table 3, t = 60 h, and the training time input allocation ratio of Subsidiaries 1 and 2 α_1:α_2 changed from 50%:50% to 70%:30%:

The values of Subsidiary 1 show that parameter $P_1(\alpha_1 t)$ increased, the operating income increased as the value increased from $25.0179 million to $25.0967 million, and the cost of training investment under sustainability $I_1(\alpha_1 t)$ also increased from $1.2 million to $1.872 million; however, the number of medical disputes $D_1(\alpha_1 t)$ decreased from $402,000 to $401,400, and its $\pi_1(\alpha_1 t)$ value decreased from $23.42 million to $22.82 million. This indicates that when the training time is longer, the input cost is higher, the medical loss is lower, and the operating revenue is higher.

The values of Subsidiary 2 show a reduction in parameters $P_2(\alpha_2 t)$ and reduced operating income from $18.01 million to $17.893 million; thus, its cost of training investment under sustainability $I_2(\alpha_2 t)$ also decreased, while the incidences of medical disputes $D_2(\alpha_2 t)$ increased, and the $\pi(t)$ value decreased. This indicates that when the training time is shorter, the input cost is lower, the medical loss is higher, and the operating revenue is lower.

Regarding Subsidiary 1, when the total number of employees' functional training time is t = 60 h:

The allocation ratio of training time investment α_1 under sustainability is increased, and employees' professional ability is increased due to the increase of functional training time; such reduction of medical disputes reduced the cost of medical compensation and medical risks. The operating income under sustainability $P_1(\alpha_1 t)$ is increased. Due to the increased cost of Subsidiary 1 for functional training under sustainability $I_1(\alpha_1 t)$, its net profit of aesthetic medical operating income $\pi(t)$ is decreased.

Regarding Subsidiary 2, when the total number of employees' functional training time is t = 60 h:

The allocation ratio of training time investment α_2 under sustainability is decreased, the investment training cost is relatively reduced, and the increase in medical disputes leads to an increase in medical compensation costs. Thus, the operating income under sustainability $P_2(\alpha_2 t)$ is reduced. As the net profit of aesthetic medical operating income $\pi(t)$ also decreased relatively, the amount of training costs invested in sustainability affects the net profit of the operating income.

When the training time input allocation ratio in Tables 4–6 is increased from 50%:50% to 70%:30%, the parameter t^* is also increased from 60 to 100 h:

The values show that when parameters $P_1(\alpha_1 t)$, $P_2(\alpha_2 t)$ are increased, the operating income is increased, the cost of training input under sustainability $I_1(\alpha_1 t)$, $I_2(\alpha_2 t)$ is increased, the cost of compensation resulting from medical disputes $D_1(\alpha_1 t)$, $D_2(\alpha_2 t)$ is decreased, and the $\pi(t)$ values are all decreased.

When the training time input allocation ratio under sustainability is 50%:50%, the parameter t increased from 60 to 100 h; thus, the value $\pi(t)$ decreased from \$41.0149 million to \$39.7951 million. When the training time input allocation rate is 60%:40%, the parameter t is increased from 60 to 100 h, and the value $\pi(t)$ is decreased from \$40.744 million to \$39.1568 million.

When Subsidiary 1's training time input allocation ratio under sustainability is 70%:30%, parameter t is also increased from 60 to 100 h, and value $\pi(t)$ is decreased from \$40.3864 million to \$38.373 million. When the training time input allocation ratio under sustainability is 50%:50%, the parameter t is also increased from 60 to 100 h. The increase in medical disputes leads to a decrease in the value of medical compensation costs $D_1(\alpha_1 t)$ from \$40.2 million to \$40.12 million.

As indicated by the above parameters, Subsidiary 1 is an invasive plastic surgery medical business, the development time of surgical medical technology is longer, the distribution ratio of each training session is not high, the investment time is longer, and the investment costs increase. However, as the cost of medical compensation is reduced due to the reduction in medical disputes, the net revenue of the operating income under sustainability is increased.

When Subsidiary 2's training time input allocation ratio is 60%:40%, parameter t is also increased from 60 to 100 h, and the increase in medical disputes leads to a decrease in medical compensation costs, as $D_2(\alpha_2 t)$ is decreased from \$251,100 to \$250,600. When the training time input allocation ratio under sustainability is 70%:30%, parameter t is also increased from 60 to 100 h, and the increase in medical disputes leads to a decrease in medical compensation, as $D_2(\alpha_2 t)$ is decreased from \$251,400 to \$250,800, which is due to the changes in the decreasing value becoming slower.

The above parameters suggest that Subsidiary 2 provides skincare and aesthetic medicine, which has shorter training time and more items. Therefore, when the investment in training hours t is increased, the training time input allocation ratio decreases, the investment in training costs under sustainability increases, and the cost of medical compensation decreases; however, the rate of change becomes slower, and the net revenue of operating income $\pi(t)$ is increased.

Table 3. Sensitivity analysis of t = 60 h. Unit: million NT\$.

$\alpha_1 : \alpha_2$	$P_1(\alpha_1 t)(+)$	$I_1(\alpha_1 t)\,(+)$	$D_1(\alpha_1 t)\,(-)$	$\pi_1(\alpha_1 t)\,(-)$	$P_2(\alpha_2 t)(-)$	$I_2(\alpha_2 t)(-)$	$D_2(\alpha_2 t)\,(+)$	$\pi_2(\alpha_2 t)(-)$	$\pi(t)(-)$
	Value	Value	Value	Value	Value	Value	Value	Value	Value
50%:50%	25.018	1.200	0.4020	23.420	18.010	0.160	0.2508	17.599	41.015
60%:40%	25.0639	1.518	0.4017	23.140.	17.967	0.116	0.2511	17.604	40.744
70%:30%	25.097	1.872	0.4014	22.820.	17.893	0.078	0.2514	17.563	40.386

Table 4. Sensitivity analysis of $\alpha_1:\alpha_2 = $ 50%:50%. Unit: million NT\$.

t	$P_1(\alpha_1 t)(+)$	$I_1(\alpha_1 t)\,(+)$	$D_1(\alpha_1 t)\,(-)$	$\pi_1(\alpha_1 t)\,(-)$	$P_2(\alpha_2 t)(+)$	$I_2(\alpha_2 t)\,(+)$	$D_2(\alpha_2 t)\,(-)$	$\pi_2(\alpha_2 t)\,(-)$	$\pi(t)\,(-)$
	Value	Value	Value	Value	Value	Value	Value	Value	Value
60	25.018	1.200	0.4020	23.420	18.010	0.160	0.2508	17.599	41.015
70	25.057	1.463	0.4017	23.190	18.035	0.203	0.2507	17.58.	40.775
80	25.087	1.750	0.4015	22.940	18.053	0.250	0.2506	17.55.	40.488
90	25.020	2.060	0.4013	22.560	18.070	0.300	0.25056	17.51	40.160
100	25.128	2.400	0.4012	22.330	18.079	0.360	0.2505	17.46	39.795

Table 5. Sensitivity analysis of $\alpha_1:\alpha_2 = $ 60%:40%. Unit: million NT\$.

t	$P_1(\alpha_1 t)(+)$	$I_1(\alpha_1 t)(+)$	$D_1(\alpha_1 t)(-)$	$\pi_1(\alpha_1 t)\,(-)$	$P_2(\alpha_2 t)(+)$	$I_2(\alpha_2 t)(+)$	$D_2(\alpha_2 t)(-)$	$\pi_2(\alpha_2 t)(-)$	$\pi(t)(-)$
	Value	Value	Value	Value	Value	Value	Value	Value	Value
60	25.064	1.518	0.4017	23.140	17.967	0.116	0.2511	17.604	40.744
70	25.097	1.872	0.4014	22.820	17.998	0.144	0.2509	17.602	40.426
80	25.121	2.262	0.4013	22.460	18.021	0.176	0.2508	17.591	40.052
90	25.140	2.688	0.4011	22.050	18.039	0.212	0.2507	17.578	39.628
100	25.155	3.150	0.4010	22.600	18.053	0.250	0.2506	16.557	39.157

Table 6. Sensitivity analysis $\alpha_1{:}\alpha_2 = 70\%{:}30\%$. Unit: million NT\$.

t	$P_1(\alpha_1 t)(+)$	$I_1(\alpha_1 t)\ (+)$	$D_1(\alpha_1 t)\ (-)$	$\pi_1(\alpha_1 t)\ (-)$	$P_2(\alpha_2 t)(+)$	$I_2(\alpha_2 t)\ (+)$	$D_2(\alpha_2 t)(-)$	$\pi_2(\alpha_2 t)(+)$	$\pi(t)(-)$
	Value	Value	Value	Value	Value	Value	Value	Value	Value
60	25.097	1.872	0.4014	22.823	17.893	0.078	0.2514	17.563	40.386
70	25.125	2.331	0.4012	22.393	17.935	0.096	0.2512	17.587	39.981
80	25.146	2.838	0.4011	21.906	17.967	0.116	0.2511	17.599	39.505
90	25.162	3.395	0.4010	21.366	17.991	0.137	0.2510	17.633	38.969
100	25.175	4.000	0.4009	20.773	18.010	0.160	0.2508	17.600	38.373

5. Conclusions

This study constructed a second-order differential model to provide the aesthetic medicine industry with a reference for allocating the most appropriate training time, increasing customer value, lowering operating costs, and helping owners to achieve overall maximum profits in financial management under the concept of sustainable operational development. Enterprises target to minimize the uncertainties of risk management operations. Enterprise risk management should thus minimize financial distress, direct and indirect costs from earnings volatility, and medical disputes and further improve service quality by selecting the best path to reduce medical losses (Paape and Speklè 2012)

From a management perspective, this study has obvious implications. The mathematical model can be used as a tool for the aesthetic medicine industry to reduce medical risks and improve revenue performance. It can also be employed as a way to lower the sustainable operational risks of the aesthetic medicine industry. This study extensively explains how to use mathematical models as tools that can help enterprise decision-makers to evaluate and make the required improvements.

5.1. Academic Implications

The U.S. healthcare ecosystem is a US\$5 trillion market, and the market is expected to grow to US\$5.5 trillion by 2025. As the healthcare market keeps expanding and growing, inherent risks also increase (Puchley and Toppi 2018). In an academic sense, this study's second-order differential model analysis refers to using the derivations of mathematical symbols and numerical calculations, introducing mathematical methods, studying modeling feasibility and applicability, changing the relationship between sensitivity analysis and functions, and providing reasonable and practical feasibility support for the model's reliability and validity in economic sustainable operations or financial management decision-making analysis. The second-order differential model is integrated with numerical methods and sensitivity analysis to find the optimal functional training time, which can reduce enterprises' operational risks. This supports the novelty of cost analysis and risk management in the medical industry. This mathematical model only preliminarily discusses how the individual behaviors of companies can reflect the value of feasibility in a simple model. It is expected that future researchers develop more diverse mathematical modeling methods and introduce and increase the discussion basis for more real and feasible sustainable operational values.

5.2. Managerial Implications

Successful management practices of sustainable operational risks enable enterprises to effectively increase value and manage risks (Lechner and Gatzert 2018). Practically, under fierce market competition, sustainable operations require economic and financial efforts. Complete training of practitioners is also required in order to provide customers with the best service quality, reduce medical errors or disputes, strengthen risk and financial management, and generate huge economic benefits, which will inevitably become the core competitive advantage of the aesthetic medicine industry's sustainable operations.

From a management perspective, this study has obvious implications. Herein, we explore the employee skill training of aesthetic medicine operators and the proportion of their cost investment so as to reduce financial compensation and losses due to medical negligence. From the analysis of two medical companies with different projects, second-order differential model analysis is used to provide

aesthetic medicine business owners with the most appropriate investment cost of functional education and training, which can reduce medical losses and bring the greatest revenue to the enterprises. As Subsidiary 1 requires longer training time, its training costs are higher, but its operating revenue is higher. However, as the training time of Subsidiary 2 is not too long, the investment training cost is lower, and the number of medical disputes is relatively higher. When the training time is increased to a certain proportion, the medical disputes and medical losses of Subsidiary 2 are reduced, and the revenue is increased. However, if the training time continues to increase, the number of medical disputes increases, and the revenue decreases. As a result, as the medical technology or equipment operation of Subsidiary 2 is a skill and not a technique, and only repeated operations are required. If more time is given for training, the number of medical disputes will not decrease. Therefore, the method in this study provides a decision-making reference for maximum profits and for when owners in the aesthetic medicine industry adopt sustainable operations in terms of professional training input of practitioners.

5.3. Research Contributions

The novelty of this paper can be proved by the second-order differential model, which can assist in the medical risk decision-making of the aesthetic medicine industry. First, the analysis method in this study can organize the theoretical framework of economical or financial decision-making in a more rational, logical, and clearer manner. Second, the feasibility and applicability of the modeling can demonstrate the changes in the relationship between the variables and functions through sensitivity analysis. This study contributes to the existing literature in a few ways. For example, in terms of the two companies' medical risks, the optimal functional training time (which means the optimal time cost) is analyzed in order to reduce medical losses as well as uncertainties in the external environment of enterprise risk management and the internal environment of financial management, thus providing reliability and validity in the model's applicability and fitness as well as rational and practical feasibility support. The results of this study help owners and managers of aesthetic medicine enterprises to focus on enterprise risk management practices, financial education, and competitive strategies to achieve sustainable operations in a fierce market.

5.4. Research Limitation

There are many factors that affect the sustainable operations of enterprises. To narrow the research scope, only incidences of medical risk problems are connected with functional training time and revenue.

The sustainable operations of enterprises are not limited to employee training performance investments, environmental costs, and corporate social responsibility costs in the social aspects, which are too extensive. Therefore, this study only focuses on the risk of employee training that affects the social aspects of enterprises, which is one research limitation.

This model explores the individual financial and economic behaviors of a company. Based on the relevant data of the individual company, the mathematical model was constructed to find the most suitable decision variables and to provide decision-making analysis and judgment on the firm's individual economic behaviors. The discussion on the importance of the individual economic behavior can be used as reference for the overall economic behavior of the follow-up aesthetic medicine industry. That is, the basis for the exploration of the macro-thinking of the overall economic behavior after the construction of the micro-structure of individual economic behavior is the process of the transformation of the feasibility analysis of mathematical models into the econometric analysis. When individual economic behaviors can be developed into industrial-economic behaviors, econometric analysis can be further performed.

5.5. Suggestions for Future Research

As there are many factors that affect the sustainable operations of enterprises, this study can only conduct empirical tests on some factors in a limited research time. It is suggested that future researchers include more important factors that affect the sustainable financial and environmental aspects of the aesthetic medicine industry. For example, future work can analyze important factors such as the relationship between advertising and marketing and sustainability–financial performance, the relationship between green marketing and sustainable operations, or the relationship between green medical procurement and environmental aspects.

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