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Examining the Impact of Internationalization and Competitive Advantages on Enterprise Performance in Taiwan's Computer Numerical Control Machine Industry

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Abstract: An enterprise must have good operating performance to operate continuously. A good company itself must have a good management team and a large enough market to operate. Taiwan is located in East Asia, and has neighboring countries, such as Japan, South Korea, and the Philippines. Taiwan's machine tools industry cannot be developed on a large scale due to the geographical environment and land area restrictions. Enterprises are constrained by the external environment, which includes economic cycles, raw materials supply, user demand, and other factors that influence their performance. This is the primary challenge currently faced by Taiwan's CNC industry. According to relevant research, companies can utilize various strategic models to identify operational shortcomings from the perspective of their employees, in order to enhance business performance. Therefore, Taiwan's machine tool industry has to be extended to a larger scale. In the international market, only by exporting products and, then, taking full advantage of higher-quality capabilities, can we create good corporate performance. Therefore, internationalization is an important factor for Taiwan's companies to improve their operating performance. This article uses Taiwan's machine tools industry to explore the impact of factors, such as international perspectives and competitive advantages, on operating performance; this study selects 62 companies as a sample, the period is 2022. and analyzes the data type using class regression. The empirical results show that in the initial stage of internationalization, internationalization and competitive advantages help companies improve their operating performance. The industrial environment has a positive regulatory effect on internationalization and enterprise performance. However, when the company reaches the stage of internationalization, its operating performance begins to decline. Therefore, companies must recognize their own operating capabilities and create a more favorable operating performance under internationalized strategies. The important factor is that only through continuous innovation can companies gain an advantage in their long-term operations. With the advent of the era of Industry 4.0, industry knowledge is highly intensive and competition within the international environment is fierce. Companies should plan for a long-term competitive advantage to improve enterprise performance.

Keywords: competitive advantages; CNC machines; operating performance; industrial environment; internationalization

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1. Introduction

The rise of globalization is an ideal time to expand your company's size and global reach. For businesses looking to expand, there are plenty of opportunities to take advantage of, such as adding global human resources or increasing the volume of information to help build a company's brand positioning. However, to truly go global, adequate preparation is indispensable [1]. The two most critical steps in this process are product localization and internationalization. Although localization and internationalization both fall into the category of "globalization", there are still some differences between the two, which

we will explore further below. Internationalization is a corporate strategy focused on maximizing the adaptability of products and services [2,3]. The progress of science and technology has ushered in the era of globalization. This study takes Taiwan's CNC industry as the research object. The full English name for CNC is computer numerical control. Therefore, CNC is a method that leverages the precise and powerful computing capabilities of computers to control machines for precision machining. Machines referred to as CNC machines, including CNC machine tools, CNC lathes, and CNC milling machines, all rely on computer calculations for their processing operations. CNC not only enables greater flexibility and automation, but also expands the realm of precision processing possibilities, such as the direct conversion of 3D design drawings into CNC codes through CAD/CAM software such as the mastercam for immediate processing. The operating principle of CNC machines is to translate the programs authored by engineers into movement instructions and carry out precise machining on the designated target [4,5].

Leveraging the efficient experience accumulated by Taiwan's CNC (computer numerical control) machinery companies, coupled with Taiwan's economic environment, and other factors, corporate internationalization has become the path to sustainable development for every company. Enterprise internationalization is one of the most important issues in the field of strategic management [6]. Therefore, companies must delve into various areas, including strategy, marketing, finance, and technology. For example, companies can improve corporate performance through different international strategies, international marketing, and investments in various international markets. Many studies emphasize the advantages of corporate internationalization. It provides businesses with an operational competitive advantage, allowing them to expand into overseas markets, leverage intangible assets and market power, spread risks, and gain access to a cost-effective workforce. This includes international trade, which involves shipping products to different regions and countries, as well as using research and development, innovative product displays, online marketing, magazine media, and other promotional advertising to increase company visibility and improve business performance. Historically, research on the business models of Taiwanese CNC companies has been limited. Whether it is the export of complete machines or key parts, Taiwan occupies a vital position in the global CNC industry. This study aims to determine the relative importance of factors that influence business strategy [7]. This paper uses questionnaire statistics and data analysis to conduct strategic research on Taiwan's CNC machine tool industry. The findings indicate that internationalization and the application of various strategies, directly or indirectly, affect a company's business performance. These results are consistent with past related research, revealing how accumulated experience and capabilities in international trade, R&D, and technology, affect the operating performance of the CNC machine tool industry, which is a reflection of the degree of internationalization of enterprises. Internationalization is still the key growth strategy for the CNC machine tool industry [8,9]. The paper concludes by highlighting the significance of this study and proposing future research directions.

2. Literature Review

2.1. The theory of Internationalization

Internationalization is a company strategy that aims to improve the ability of products and services to adapt to local conditions as much as possible, so that they can easily enter the markets in different countries/regions, usually requiring the assistance of subject matter experts. Internationalization can help companies acquire knowledge and technology through foreign markets, thereby giving companies the opportunity to learn new skills, improve existing products, and develop new products, thereby increasing profits [10]. Internationalization is sometimes referred to simply as "i18n", where 18 represents the number of English letters in the middle of the word [11]. Going international is an important decision for a company, which involves many challenges and choices. For example, should a company choose to expand to developed countries in Europe and the United States, or to emerging markets in Southeast Asia; should they create their own brand; and

how should they go about turning their local advantages into international competitiveness [5]. In addition, when entering emerging markets, such as Southeast Asian countries, companies are faced with how to develop new products and services that are suitable for them [12], rather than just imitating the existing things in the West and applying them to the same market. Enterprise internationalization is a process. Through continuous investment in resources and the establishment of various value chain activities, enterprises have gradually increased their involvement in overseas operations. During the process of enterprise internationalization, which is increasingly crucial for long-term success [13], scholars have found that enterprise internationalization is a "gradual" process. By gradually accumulating experience in international operations, companies are able to lay out the layout for the future development of the enterprise. Internationalization process theory has, thus, become one of the theories that occupies an important position in the field of internationalization research. The theory on the internationalization process refers to the whole process concerning an enterprise's internationalization. The process was mainly manifested in the evolution of the enterprise's international business decision-making method, and the deepening of the degree and level of internationalization. Moreover, due to a lack of resources and a lack of understanding of overseas markets, which tends to result in the development of international careers in countries with a closer psychological distance, the so-called "psychic distance" is a consideration factor in the early stage of internationalization of enterprises, which refers to the language, education, business practices, culture of the country and other countries, industrial development, political, economic, and legal structures, etc. [14]. The results of a series of decisions, that is, the current internationalization of enterprises, is an important factor affecting the state of future internationalization, including knowledge and resources. The lack of internationalization is the biggest obstacle to internationalization. Therefore, enterprises can reduce the obstacles encountered during internationalization and the uncertainty of foreign investment by accumulating an operating experience in the international market [15]. The internationalization of an enterprise is a gradual process involving a series of stages. During the process, an enterprise will profit from the continuous acquisition and use of knowledge on overseas markets, and will gradually increase the investment of resources in overseas markets in the process of internationalization. The globalization of economics has created opportunities that have led to an ever-increasing number of suppliers of raw materials and products. The way enterprises choose to enter a market will develop from low resource investment to high development factors. In the selection of overseas market regions, companies will gradually tend to choose markets with a greater psychological distance, which implies that companies adopt an entry mode for a specific market and the selection of overseas markets is based on the assumption of a predictable development path [16–18]. The globalization strategy of international enterprises has a gradual development process. From the initial stage to the fully internationalized management stage, the management strategies of international enterprises can be classified into the following two types: the contractual agreement strategy and the foreign direct investment strategy [19]. These two strategies show the vertical growth trajectory of international enterprises, and they are not completely replaceable relationships, but are relatively independent and interdependent relationships [20]. The results of a series of decisions, that is, the current internationalization of enterprises is an important factor affecting the state of future internationalization, including knowledge and resources. The lack of internationalization is the biggest obstacle to internationalization. Therefore, enterprises can reduce the obstacles encountered during internationalization and the uncertainty of foreign investment by accumulating an operating experience in the international market [21].

2.2. The Theory of Competitive Advantage

An enterprise can operate sustainably only when it maintains a strong operating performance. In addition to meticulous management, businesses also require access to a sufficiently large market. Taiwan's neighboring countries, including Japan, South Korea,

and the Philippines, possess domestic markets that surpass Taiwan's in terms of both land area and population. Consequently, domestic small and medium-sized enterprises must expand beyond their relatively small domestic markets and enter larger international markets. They can then leverage domestic manufacturers to enhance their operations. Exceptional capabilities are essential for achieving superior corporate performance. Therefore, internationalization stands as a crucial factor for Taiwanese companies seeking to enhance their business performance [22,23]. A competitive advantage involves a company having better capabilities and being in a better position than its competitors in the same industry. From the perspective of business operations [24], the purpose of having a competitive advantage is, of course, to make continuous profits. Continuous profits can promote the sustainable operation of the company and enhance employees' salaries and happiness [25]. A competitive strategy is a type of business strategy, and a strategy is the way to achieve goals. Therefore, a competitive strategy can be understood as a strategy to obtain a competitive advantage in the short term and bringing the company sustainable profits in the long term. There are three basic types of corporate competitive advantage, including cost leadership, differentiation, and focus [26,27]. Cost leadership is the key to maintaining selling prices and reducing operating costs. Differentiation is the ability to maintain operating costs and differentiate products and services from competitors. Focus is the ability to target niche markets and lock in large competitors who are not interested in niche markets [28–30]. A "competitive advantage" refers to the "resources or capabilities" an enterprise possesses, but not all resources and capabilities can be called "advantages" [31]. According to the principle of strategic advantage [32], the resources and capabilities that can be called corporate advantages must meet the following conditions: (1) scarce, very rare and rare in the market; (2) immobile, it cannot be used by other companies unless the company agrees; (3) scopable, in addition to the current field of application, it can be expanded and applied to other fields, businesses, and industries [33,34].

There are many ways for enterprises to build competitive advantages. The proposed method proposes that enterprises make good use of resources to build competitive advantages, which can not only have the effect of stabilizing the foundation of competition, but also has the effect of exclusivity. Enterprises that advocate building a competitive advantage with resources must strictly abide by the following four principles [35–37]:

1. Providing value: Enterprise management aims to convert resources into values provided to customers. Only such resources can be meaningful and can build competitive advantages.
2. Rarity: Taking advantage of a company's own advantages or combining the strengths of existing manufacturers to adopt a construction barrier strategy to make it difficult for competitors to obtain similar resources and prevent potential competitors from entering the industry, so as to enjoy competitive advantages and create profits.
3. Imitability: In addition to being scarce, resources that can be used to build competitive advantages must also have characteristics that are not easily imitated, so that they are able to last for a long time.
4. Competence: Enterprise management pays attention to effectiveness and efficiency. Competence refers to the ability of a company to effectively apply limited resources to the right place at the right time. In this study, our current enterprise advantage is divided into two parts: manufacturing and after-sales service advantages.

2.3. The Theory of Enterprise Performance

New businesses that embark on internationalization often bring with them special technologies or resources that they can share with existing businesses. They may also combine their original resources, or make effective use of their remaining resources, in the process of going international. This approach not only enhances resource utilization, but also generates scope economic benefits, ultimately leading to improved corporate performance. Diversifying into new markets can create synergies and opportunities for growth, making internationalization a strategic move for companies looking to thrive in the

global market [38]. From the perspective of strategic management, enterprise performance is only a part of the overall concept of organizational performance [39]. There are three different levels of performance measurement: (a) financial performance, in the narrowest sense of enterprise performance, most simple financial indicators are used to reflect whether the economic goals of the enterprise are being achieved. Common indicators include sales growth, profitability (such as ROI, ROS, ROE, etc.), EPS, and other indicators based on the company's market value [40]. (b) Financial and operational performance: in a broader sense, operational performance includes operational (non-financial) indicators, in addition to financial indicators, such as market share, new product introduction, product quality, marketing effect, and the benefit of manufacturing. (c) Organizational performance: in the broadest sense of enterprise performance, in addition to the internal enterprise performance of the enterprise. It also considers the satisfaction of the goals of all the stakeholders in the business operation, such as customers, suppliers, competitors, and competent authorities. Organizational performance consists of two parts, one is the goal of the economic organization in a capitalist society, namely the production, sales, and profit, which can be measured by labor productivity; and in order to achieve the goal of improving labor productivity, the organization must assist with the secondary goals. For example, labor productivity can be achieved, such as reducing absenteeism [41], through encouraging employees to make suggestions for improving efficiency, and improving employee morale.

In order to avoid corporate management being too important to financial performance indicators, companies have developed a combination of (a) a financial dimension, (b) a customer dimension, (c) operational performance measurement indicators in four major areas, including the internal process dimension, and (d) the employee learning and growth dimension. In order to drive the business strategy on "revenue and profitability growth" of the company from the perspective of shareholders, financial dimension indicators are used; customer dimension indicators [27,42], which involved looking at things from the customer's point of view, are used to drive the product or service for the "value creation" loyalty strategy; the service strategy of "operational efficiency and innovation" is also used [42], from the point of view of the operations through process aspect indicators; the development strategy of "human resources" is also used, from the perspective of employees, through learning and growth indicators [28].

2.4. The Theory of Industrial Environment

The industrial environment refers to the environmental factors that affect organizations in the same industry. Unlike the general environment, the industrial environment only affects the enterprises in a specific industry and the enterprises that have a business relationship with that industry [43]. The industrial environment survey of enterprises should focus on examining the scale of production and operations, the industrial status, competition status, production status, industrial layout, market supply and demand, industrial policies, industry barriers and entry barriers, and industry development prospects for the industry or the industry that they want to enter [44]. The analysis of the industrial environment mainly includes two aspects: one is the nature of competition in the industry and the potential profits in the industry; the other is the differences in operation among the enterprises within the industry and the relationship between these differences and their strategic positions. A common tool for analyzing the former is the "five forces model" proposed by Porter, as we know the importance of researching our competitors. It is extremely important for the long-term development of enterprises to analyze the niche points of their own products in the market, compared to their opponent's marketing strategies, product advantages, market trends and other intelligence [9]. Poster's five forces model is a good starting point. This method can help firms' analyze the opportunities and difficulties that various potential competitors in the industry may cause from five different aspects. If a firm can further match the SWOT analysis in regard to these five aspects [45], I think they

will be able to more clearly identify the way to solve the competition problem, which will definitely improve their competitive advantage [46–49].

(1) Competition in the industry

Also known as the "peer industry", the confrontation between existing competitors, the number of competitors in this industry, and the level of competitors, affect the difficulty of your company's survival in the market. When your competitors are close to yours in terms of size, product level, and resources, consumers can easily switch between your company and several competitors, and the competition is fierce. The key to success at this stage is the creative operation of price, advertising, product introduction, after-sales service, and brand building.

(2) Potential of new entrants to the industry

If the threshold for entering the industry is high, you will be able to maintain a dominant position in the market, because there are not many choices for customers, and there are few opportunities for comparison between products, which is equivalent to high professionalism. In this state, the profit of the enterprise is high. On the contrary, if the entry threshold is low, the differentiation is small, and the products begin to enter the competition on price and value-added services. Enterprises need to spend more effort to win the same attention from customers. Therefore, the entry threshold is a problem for existing companies in the industry. Protective barriers exist and, for new companies, minimum standards apply for market entry.

(3) Power of suppliers

The number of suppliers, the quality, price, and differences between the products supplied will determine the cost and profit of the enterprise when manufacturing products. When the number of suppliers is small, the differentiation of the supplied products is large, and there is market demand for the characteristics of the supplier's products, suppliers have strong bargaining power, and it is difficult for enterprises to reflect the costs from suppliers. On the contrary, when the number of suppliers is large and enterprises have many choices, the bargaining power of suppliers is weakened, and enterprises will be in a position of relative advantage.

(4) Power of customers

It must be hoped that the products purchased from the industry are of good quality and are low priced, the service is thoughtful, and the competition among the existing enterprises in the industry is profitable. Therefore, customers always bargain with the enterprises in the industry in order to lower the price and demand the improvement of product quality, and the service level, which makes the enterprises in the industry compete with each other and kill each other, resulting in the decline of industrial profits. The main factors that affect the bargaining power of the buyer are the concentration of the buyer, the proportion of the buyer's product purchased from the industry at cost, the standardization degree of the buyer's purchase of the product from the industry, the cost of switching, the profitability of the buyer, the buyer's backward integration, the possibility of transformation, and the degree to which the buyer's information is available.

(5) Threat from substitute products

The emergence of substitutes may be a contest between different industries. When substitutes attract consumers with more attractive advantages, it may be a huge problem for the original product suppliers in terms of product advantages and cost adjustment.

3. Methodology

3.1. Research Procedure

Research was carried out on the influence of internationalization and competitive advantage in Taiwan's CNC machines industry on enterprise performance, using the industrial environment as the interference variable. This research adopts the questionnaire survey

method as the research method. The domestic and foreign journals and the literature related to the industrial environment and enterprise performance were compiled to collect data related to the research topic, establish the research structure, compile questionnaires, and conduct questionnaire surveys. Firstly, the content validity of the research questionnaire was confirmed using the expert questionnaire and, after compiling expert opinions, the pre-test questionnaire was compiled, and then the questionnaire was pre-tested. After the pre-test questionnaire was collected, the discrimination, reliability, and internal consistency of the questionnaire items were analyzed using item analysis. And factor analysis was used to understand the construct validity of the questionnaire, as the basis for the revision of the questionnaire. After completing the project analysis and questionnaire revision, a formal questionnaire was formed, and then the formal questionnaire was administered. After the formal questionnaire was collected, statistical analysis was performed. After statistical analysis, the results of this study were compiled and, finally, the conclusions and recommendations from this study were written according to the research results [34,42]. Based on the research purpose and the literature review results, this study proposes the following research hypotheses (Figure 1):

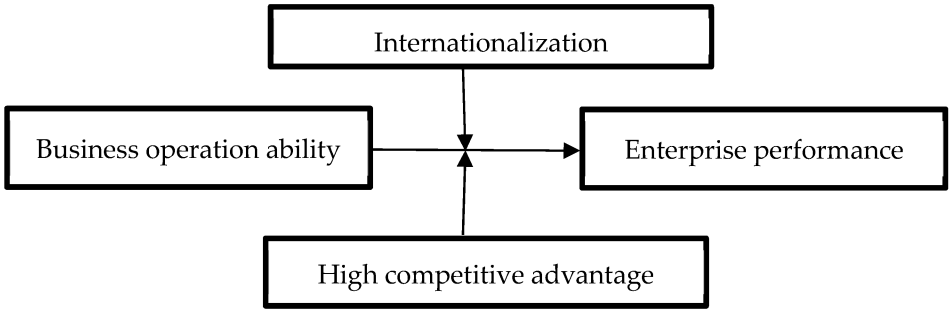


Figure 1. The model on the proposed hypotheses.

Hypotheses 1 (H1). *The high degree of internationalization in Taiwan's CNC machines industry has a positive impact on enterprise performance.*

Hypotheses 2 (H2). *The high degree of competitive advantage in Taiwan's CNC machines industry has a positive impact on enterprise performance.*

Hypotheses 3 (H3). *The high degree of internationalization in Taiwan's CNC machines industry has a direct impact on the competitive advantage.*

Hypotheses 4 (H4). *The better the business operation ability, the stronger the positive relationship between internationalization and enterprise performance.*

3.2. Participants and Research Tools

This research adopts the questionnaire survey method and takes the department heads and above in the Taiwan CNC machines industry as the research object to explore the research on the impact of internationalization and competitive advantage on enterprise performance, taking the industrial environment as the interference variable, from3 November 2022 to 29 December 2022, a questionnaire survey was conducted by means of intentional sampling. A total of 350 questionnaires were distributed, and 64 incomplete questionnaires were deducted. In the end, 286 valid questionnaires were obtained, with a valid response rate of 82%. After the literature research, analysis, and inductive integration, the content of the questionnaire for this study was initially constructed, and the content for each scale was then consulted for suggestions and opinions from experts and scholars. The existing items were removed or new items were added to ensure the validity of the scale and to establish the content validity of the questionnaire. Experts and scholars, who are relevant and experienced in this research and have a full understanding of the research topic, assisted in

reviewing and revising the content to establish the content of the questionnaire in terms of the representativeness, appropriateness, word choice, scoring method, and arrangement format of the questionnaire items. The experts and scholars are listed in Table 1.

Table 1. Expert background for the questionnaire.

Expert	Duty Position	Gender	Educational Background	Seniority
A	manager	M	Bachelor. Mechanical	15–20 years
B	CEO	M	Master. Materials engineering	10–15years
C	manager	F	Ph.D. Industrial management	15–20 years
D	manager	M	Bachelor. Mechanical	15–20 years
E	professor	M	Ph.D. Mechanical engineering	15–20 years
F	professor	F	Ph.D. Engineering educational	11–15 years
G	professor	M	Ph.D. Educational statistics	15–20 years
H	professor	M	Ph.D. Mechanical engineering	15–20 years

3.3. Operational Definition of Variables

Based on previous relevant literature, this paper discusses the operational definition and measurement of relevant variables, as follows:

(1) Dependent variable: Enterprise performance

When discussing the impact of corporate internationalization on enterprise performance, there are generally objective and subjective measures of performance; most scholars use objective financial indicators as the measure. The three accounting measures of ROA, ROS, and ROE are often used as performance indicators for enterprises [50]. ROA shows the ability of a company to use its assets to generate profits, and this metric is suitable for comparing different model enterprises. Therefore, this paper regards the ROA as a measure of enterprise performance [42].

(2) Independent variable: Internationalization, manufacturing advantage, and after-sales service advantage

In the past, relevant studies have applied many operational definitions to the concept of internationalization, such as the ratio of overseas construction sales to total sales, and the ratio of overseas assets to total assets [51]. Generally, to measure the degree of dependence of enterprises on foreign markets or consumers, the commonly used performance attribute indicator "overseas sales ratio" is used as an indicator to measure the degree of internationalization of enterprises [52,53]. Competitive advantage means that when an enterprise faces a competitive threat in the same industry, it makes good use of advantageous strategies, such as reducing costs, creating differences, and satisfying specific customers to make it more competitive than other peers, thereby showing its characteristics and advantages. The competitive advantages are mainly based on manufacturing advantages and after-sales service [54].

(3) Interfering variables: Industrial environment

The industrial environment refers to the environmental factors that affect organizations in the same industry. Unlike the general environment, the industrial environment only affects the enterprises in a specific industry and the enterprises that have business relationships with the industry [43,55]. The analysis of the industrial environment mainly includes two aspects: one is the nature of competition in the industry and the potential profits in the industry; the other is the differences in operation among enterprises within the industry and the relationship between these differences and their strategic positions.

The industrial environment survey of enterprises should focus on examining the production and operation scale, industrial status, competition status, production status,

industrial layout, market supply and demand, industrial policies, industry barriers and entry barriers, and industry development prospects of the industry or the industry they want to enter [56]. Therefore, this study uses the potential profit from the nature of the competition in the industry and the operational differences between firms within the industry as indicators.

(4) Control variables: Independent enterprise, enterprise size, enterprise debt ratio

Independent enterprise is the principle of taxing the profits realized by the business activities of the permanent establishment itself [57]. Treat a permanent establishment as a separate taxable entity and calculate profit and loss as a separate enterprise. Whether a permanent establishment has business dealings with its head office or with other agencies of an affiliated enterprise, its profits should be calculated according to the open market competitive prices. For transactions that do not conform to the principle of fair market competition, tax authorities may readjust the prices of the same or similar goods and services in the market under the same or similar conditions. In the absence of a competitive price reference in the open market, and the account book vouchers of the permanent establishment are insufficient to reasonably calculate its profits, the tax authorities can also use the method of verifying its profit rate to make an estimate [58]. The scale of an enterprise refers to the resources and operating results it has accumulated since its establishment. The larger the scale of the enterprise, the higher the normal profit rate it has, the more resources it has available and the richer market relationships and capabilities, and the stronger the risk-taking resources [59]. Debt is one of the factors that affects the performance of an enterprise. The higher the debt ratio, the less its own funds, and the higher the capital cost of the enterprise, so the performance of the enterprise will be poor. Capital structure, especially debt, is one of the important factors that can affect corporate performance and operational risk [59,60].

3.4. Data Analysis Methods, Sources, and Sample Selection

(1) Descriptive statistics

Use descriptive statistical analysis for many variables in this paper, and describe the coefficients, such as the mean, standard deviation, etc., for each variable, one by one.

(2) Correlation analysis and collinearity diagnosis

The Pearson product moment correlation and variance inflation factor (VIF) were used to analyze the correlation between the variables, to check whether there was collinearity among the initial variables.

(3) Hierarchical regression analysis

Hierarchical regression analysis is a method that is divided into multiple steps, and the analysis work is carried out step-by-step and sequentially.

(4) Data sources

The sample data for this study was mainly taken from the corporate governance database, basic database, financial database, etc., of the Taiwan CNC machine tool and accessory builders' association (TMBA), and some variables were obtained after self-organization and calculation.

4. Results

4.1. Data Characterization Analysis

The mean and standard deviation was calculated for each variable. The correlation coefficient and the collinearity analysis were used to test whether there was collinearity. Pearson correlation coefficient analysis was used to check the relationship between the dependent variables, independent variables, and control variables. The data from Table 2 show that there is a weak correlation between the variables.

Table 2. Mean, standard deviation, and correlations.

Variable	M	SD	1	2	3	4	5	6	7
1. Enterprise performance	0.072	0.091							
2. Independent enterprises	25.311	10.541	−0.112 *						
3. Enterprise size	3.015	0.808	0.107 *	0.075					
4. Enterprise debt ratio	0.415	0.188	−0.247 ***	0.323 ***	0.135 ***				
5. Contractual agreement strategy	0.775	0.278	0.155 **	0.281	0.112 *	0.695 ***			
6. Foreign direct investment strategy	0.645	0.345	0.110 *	0.279 ***	0.030	0.115 *	0.969 ***		
7. Manufacturing advantage	0.051	0.070	0.315 ***	−0.225 ***	−0.165 **	−0.335	−0.116	−0.042	
8. After-sales service advantage	0.056	0.091	−0.165 **	0.002	−0.239	−0.126 **	−0.125 **	−0.121 **	0.191 ***

N = 286; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Before performing hierarchical regression, it is necessary to explore whether there is collinearity between the respective variables. Except for the high variance inflation factor (VIF) for the contractual agreement strategy and foreign direct investment strategy, the VIFs for the remaining variables are all lower than 10, indicating that there is no collinearity problem. The value (tolerance) column shows that each value is between 0 and 1, and not close to 0, which means that there is no collinearity problem. It is a measure of the severity of complex (multi)collinearity in a multiple linear regression model. It represents the ratio of the variance in the regression coefficient estimator to the variance, assuming a non-linear correlation between the independent variables. The model has been centrally standardized, then the covariance matrix of the regression coefficient estimator is established, as well as the product of the k-th diagonal element in the matrix. This second factor is called the variance inflation factor, denoted as VIF. It can be shown where the coefficient of determination is between the k-th independent variable and the remaining independent variables. Therefore, when the correlation between the k-th independent variable and the rest of the independent variables is higher, that is, closer to 1, the corresponding VIF is also larger. Conversely, if the correlation with the remaining independent variables is very low, the VIF will be close to 1 immediately, as shown in Table 3.

Table 3. Collinearity.

Variable	Tolerance	M	VIF
Independent enterprise	0.955	0.452	1.045
Enterprise size	0.787	0.331	1.282
Enterprise debt ratio	0.715	0.315	1.414
Contractual agreement strategy	0.651	0.228	1.336
Foreign direct investment strategy	0.640	0.158	1.351
Manufacturing advantage	0.811	0.578	1.235
After-sales service advantage	0.886	0.568	1.131

4.2. Empirical Analysis

A hierarchical regression model was used in this study, and three models were calculated to identify the individual explanatory power of each variable and its influence on the overall model. As shown in Table 4, a hierarchical regression analysis was carried out on enterprise performance. On the first level, the purpose is to control the influence of external factors (Figure 2). The results show that independent enterprise has a negative and significant effect on enterprise performance (t = −2.186, $p < 0.05$), and enterprise size has a significant positive effect on enterprise performance, with a relationship (t = 4.199, $p < 0.001$), while the corporate debt ratio has a negative and significant relationship with operating performance, the overall model fit achieves a significant level (F = −6.077, $p < 0.001$), the explanatory power is 11.2%. The overall model fit was at a significant level (F = 15.941, $p < 0.001$). After adding the independent variable contractual agreement strategy to Model

2, it was positive and significant (t = 2.544, $p < 0.05$). The independent variable, foreign direct investment strategy, was positive and significant (t = −1.981, $p < 0.05$). The independent variable, manufacturing advantage, was positive and significant (t = 5.917, $p < 0.001$). The results show that the high degree of internationalization in Taiwan's CNC machine industry directly affects its competitive advantage. Hypothesis 3 was established. The after-sales service advantage was negative but significant (t = 4.941, $p < 0.001$), the overall model fit was significant (F = 17.893, $p < 0.001$), and the overall model explanatory power increased to 25.1%. The results show that research hypothesis 2, that the high degree of competitive advantage in Taiwan's CNC machine industry has a positive impact on enterprise performance, has been established. After adding the interaction terms for the independent variables and interference variables to the third model, the interaction terms between the contractual agreement strategy and industrial environment showed a positive and significant effect on the enterprise performance (t = 3.071, $p < 0.01$). The overall model reached a significant level (F = 19.669, $p < 0.001$), and the overall model explanatory power increased to 34.7%. In terms of the independent variables, the contractual agreement strategy has a positive and significant effect on corporate performance, which means that the contractual agreement strategy has a positive relationship with corporate performance. When the marginal benefit of the contractual agreement strategy is greater than the marginal cost, there is still a positive marginal return. That is, the higher the contractual agreement strategy, the better the performance of the company and the continued expansion; that is to say, in the process of overseas market expansion, the increase in the complexity of the overseas market does not affect the profitability of the company. Therefore, scholars believe that enterprises still maintain good performance after exceeding the optimal level of internationalization [42,54–56]. Based on the above discussion, it was proved that hypothesis 1, 2, and 3 was established.

Table 4. Hierarchical regression analysis.

Variable	Model 1		Model 2		Model 3	
	Enterprise Performance	t	Enterprise Performance	t	Enterprise Performance	t
Dependent variable						
Independent enterprise	−0.105	−2.186 *	−0.059	−1.335	−0.047	−1.152
Enterprise size	0.216	4.199 ***	0.191	3.772 ***	0.165	3.544 ***
Enterprise debt ratio	−0.311	−6.077 ***	−0.283	−5.661 ***	−0.355	−7.251 ***
Independent variable						
Contractual agreement strategy			0.411	2.544 *	0.854	4.602 ***
Foreign direct investment strategy			−0.322	−1.981 *	−0.665	−3.221 **
Manufacturing advantage			0.295	5.917 ***	0.311	6.551 ***
After-sales service advantage			0.227	4.941 ***	0.188	4.215 ***
Interfering variable						
Industrial Environment					0.844	6.371 ***
Interaction						
Contractual agreement Strategy × industrial environment					1.07	3.071 **
F	15.941 ***		17.893 ***		19.669 ***	
R^2	0.113		0.250		0.346	
ΔR^2	0.113		0.138		0.095	

N = 286; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

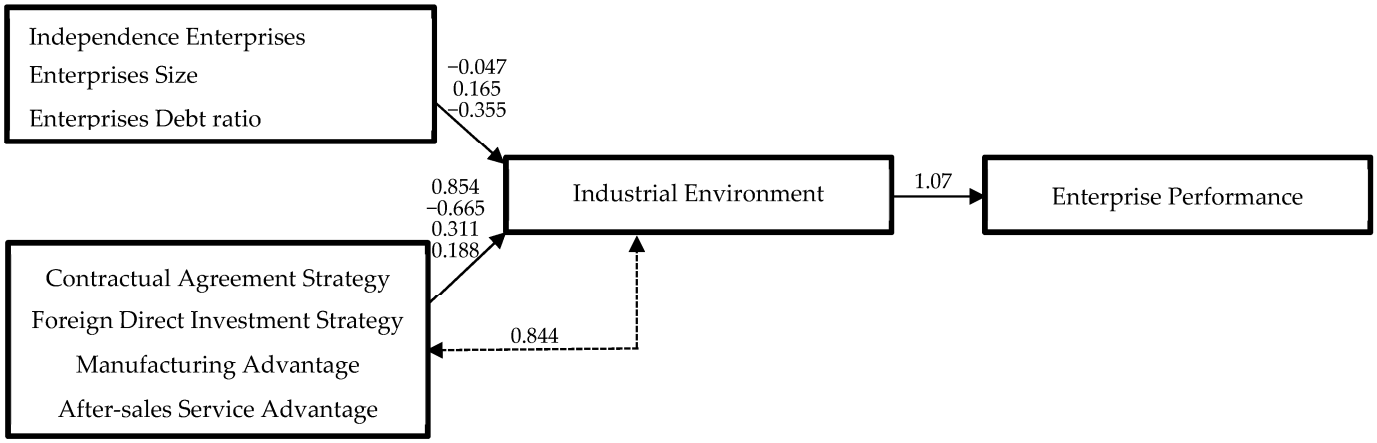


Figure 2. Path diagrams for hierarchical regression.

4.3. Interfering Variables

In terms of the interference effect, the results from this study t = 6.371 $p < 0.001$ reach a significant level. It indicates that the industrial environment has an interference effect. Research hypothesis 4 is established. To explore the reason, enterprises use their industrial environment to establish their international reputation. The layout of the business strategy is to reduce costs, obtain higher profits, and obtain better corporate performance. Thus, the profit from the company's internationalization has increased significantly. The expansion of the company should be planned, and the resources of the company are often limited. The resources of the market are not readily available, and the cost may be high or uneconomical. Therefore, there is a need for planned expansion, that is, for the expansion to overseas markets, the effective use of enterprise resources, and the improvement of operating capabilities [52–55]. This result is consistent with hypothesis 4.

5. Discussions

This study uses a hierarchical regression model to calculate three models. In the first level, the results show that corporate independence has no significant impact on corporate performance. Corporate size has a significant positive impact on corporate performance, while the corporate debt ratio and operating performance show no significant effects. In Model 2, after adding the independent variables, contract agreement strategy, foreign direct investment strategy, and manufacturing advantage, these variables all show positive and significant impacts. The results indicate that Taiwan's CNC machine tool industry has a high degree of internationalization, which directly affects its competitive advantage. In the third model, the interaction term between the independent variables and the intervening variables is introduced. The interaction term between the contract agreement strategy and the industrial environment shows a significant positive impact on corporate performance [59–61]. From the perspective of the independent variables, the contract agreement strategy has a significant positive impact on corporate performance, indicating a positive relationship. To explore the reasons and make comparisons with past research, it is found that as a company internationalizes [61,62], there is a point at which a high level of internationalization may lead to declining performance. The reasons for this decline should be explored to mitigate the impact of increased export costs on corporate performance. Furthermore, it is important to note that when the proportion of export sales reaches its peak, it might be an opportune time to enter the international market and maintain excellent performance through strategic operations. Additionally, companies face varying customer demands in different countries, making them more market sensitive, and enhancing their ability to promote and introduce new product innovations. Based on the above inference, export-oriented companies can expand their competitive advantages and improve corporate performance by focusing on multiple overseas markets simultaneously, enabling them to engage in international diversified

operations, while maintaining excellent performance. Sustainable growth is the primary factor contributing to the success of any enterprise, with innovation serving as the key driver for long-term growth. Notably, continuous innovation is essential for enterprises to gain lasting competitive advantages. In the era of Industry 4.0, characterized by high industrial knowledge intensity and intense international competition, it is recommended that enterprises assess their capabilities and plan for long-term competitive advantages to enhance corporate performance. The significance of a competitive advantage lies in its level of impact on corporate performance. Many companies have invested in new production equipment and enhanced employee qualifications, resulting in a positive impact on business performance. This can be considered their most valuable asset and the most beneficial competitive advantage. During the research process, we encountered various companies with differing perspectives. Some of these companies adopt a relatively conservative approach to business strategies and internationalization. They hold the belief that excessive reliance on internationalization-related strategies might lead to an over dependence on third-party support. In the event of a market contraction, this over reliance could result in adverse consequences that may significantly impact business operations. This is indeed an important concern for corporate management [63].

6. Conclusions

This paper proposes research on the influence of internationalization and competitive advantage in Taiwan's CNC machine tool industry on enterprise performance, and uses the industrial environment as a moderating variable. It is used to evaluate the business model on reactivating Taiwan's CNC machine tool industry to achieve better corporate earnings. In particular, the internationalization mentioned in this article is a project currently required by Taiwan's digital machine tool industry to trigger the transformation of a company's revenue and business strategy. This paper also emphasizes the importance of a competitive advantage. Research suggests that both enterprise size and internationalization have a direct influence on enterprise performance. In the research design, an additional variable, the industrial environment, was included as part of the research variables. The aim was to investigate whether the industrial environment has an impact on or potentially interferes with corporate performance. This approach allows for a more comprehensive analysis of the factors affecting how companies operate and succeed, considering not only their size and international reach, but also the context in which they operate within their respective industries. A competitive advantage involves having better capabilities and being in a better position than competitors in the same industry. The purpose of having a competitive advantage is to obtain sustained profits. Sustained profits can promote the sustainable operation of the company.

Secondly, the importance of this research is that Taiwan's machine tool industry is subject to various constraints (natural resources, raw materials, the international situation, political environment) and other factors. Therefore, it is necessary to improve the operational performance of the CNC industry through various strategic uses. Therefore, we use dependent variables, such as independent enterprise, enterprise size, and enterprise debt ratio, with independent variables, such as the contractual agreement strategy, foreign direct investment strategy, manufacturing advantage, and after-sales service advantage, to explore the correlations to find the best situation. The main advantage of this method is that decision-makers can formulate short, medium, and long-term transformation strategies, according to the current internationalization situation.

A company's manufacturing strategy is focused on production, supply chain integration, and value chain coordination. It begins with the product research and development life cycle, emphasizing seamless integration of product design and manufacturing to facilitate rapid mass production. Collaborative development with designers takes place before the official production phase. Furthermore, highly visible product differentiation, dynamic real-time production scheduling, and intelligent quality and warranty management are employed to strengthen the manufacturing strategy's advantages. The significance of this

study lies in its ability to help management in relevant enterprises gain a clear understanding of the importance of implementing multiple strategies. These provide methods and proof that the industrial environment affects business operations; they demonstrate that companies use different strategies and methods that can embed sustainable thinking to internationalize and enhance their competitive advantage. The findings from this survey can provide machine tools companies with informative and interpretive strategies and methods for enhancing sustainable business operations. Further research in the future could deepen our findings and combine different variables, such as corporate social responsibility, environmental change, environmental protection, and human resources, etc. Alternatively, research could be conducted on related transnational issues, paying attention to the business models in the CNC machine tool industry in different countries, and how to support internationalization and competitive advantages to improve the production process and quality of the global CNC machine tool industry.

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