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Analysis of the Dividend Policy Decision-Making Mechanism of Chinese and Taiwanese Lithium Battery Industries

Tzu-Chun Sheng [1], Alvin Chang [2,*], Shu-Hui Lan [3] and Shih-Cheng Li [4]

[1] Department of Finance, Ling Tung University, Taichung 408, Taiwan; morgan1125@teamail.ltu.edu.tw
[2] Department of International Business, Ling Tung University, Taichung 408, Taiwan
[3] Department of Marketing and Logistics Management, Ling Tung University, Taichung 408, Taiwan; cammylan@teamail.ltu.edu.tw
[4] Department of Industrial Education and Technology, National Changhua University of Education, Changhua City 500, Taiwan; scherng@ms39.hinet.net
* Correspondence: awhchang53@teamail.ltu.edu.tw; Tel.: +88-695-877-9999

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Abstract: This study mainly focuses on the mechanisms and influencing factors of formulating dividend policies in the Chinese and Taiwanese lithium battery industries. According to the relevant literature, enterprises should consider financial status, project operations, the decision preferences of their executives, and shareholder equity when drawing up dividend policies. This study first uses the Modified Delphi Approach to set up the hierarchy analysis structure, and then use the Fuzzy Analytical Hierarchy Process for the study method. From the empirical results, this study finds that there exist differences between Chinese and Taiwanese lithium battery manufacturing supply chains, in terms of the process and considered factors when making decisions regarding dividend policies. The empirical results of the study show that dividend policies of Chinese lithium battery manufacturers emphasize more on the future growth of enterprises, earnings expectation and retained earnings, investment decisions, enterprise scale, and operating performance and profit whereas Taiwanese lithium battery manufacturers focus more on information asymmetry.

Keywords: dividend policy; industrial management; financial strategy; Delphi Approach; Fuzzy Analytical Hierarchy Process; policy comparison

1. Introduction

1.1. The Background of Lithium Batteries Industry

The application of lithium batteries provides advantages such as cleanliness and sustainability. Such benefits, furthermore, can be extended towards solving the problems of electricity intermittency and uncertainty caused when using renewable power generation technologies. At present, global warming, thermal power generation, and the generalized power method of nuclear energy have triggered many discussions among governments and the wider public. More and more countries have advocated for the use of green energy; that is, using new and environmentally friendly power generation technologies [1]. Therefore, energy storage demands are increasing. At present, among many energy storage technologies, the lithium industry has many benefits, such as being the most large-scale industry, having a mature industrial chain, and cost control. Therefore, the lithium-ion battery industry occupies a huge market for energy storage applications. From a cost point of view, as lithium battery storage capacity has increased, associated costs and product prices have also increased [2]. In recent years, the governments and private enterprises in China and Taiwan have

paid more and more attention to improving the product capabilities of lithium batteries [2–4]. In the present marketplace, Japanese and South Korean lithium battery manufacturers still provide superior advantages, in terms of product quality and cost control. In order to further develop the lithium industry, the Chinese and Taiwanese governments have actively encouraged and supported the research institutes of enterprises in order to achieve the development and technological innovation of the lithium battery industry [3,4].

1.2. The Current Trends of Lithium Battery Industries in China and Taiwan

The lithium battery industry is a special industry, characterized by high risk, high profit, high capital, intensive technology, and an obvious industrial business cycle. Therefore, constructing a set of dividends policies which draw a balance between business growth and shareholder expectations is very important. Dividend policies are one of the most important financial decisions of an enterprise. Since April 2016, administrative measures had been formally implemented by the Chinese government to allow China's lithium battery industry to receive policy support, enhance their innovation, and build market-oriented mechanisms [4]. In addition, Chinese enterprises, such as BYD Company Limited and Tianjin Lishen Battery, have not only extended and expanded their industrial scales but have also taken into consideration the lithium battery materials technologies of upstream suppliers [5–7]. Driven by China's huge domestic demands and international markets, the lithium industry is expected to promote the rapid development of production capacity and output value of the Lithium battery industry [8]. In Taiwan, since 2012, the Lithium battery industry has focused on the application of EV batteries and solar cells [9]. At present, there are many manufacturers that have invested in technologies related to the development of automotive Lithium batteries so that the lithium battery industry can be more perfect [10,11]. Chang's Ascending Enterprise Company, Ltd. (CAEC, Taichung City, Taiwan), the upstream manufacturer of lithium batteries, in which the Formosa Plastics Group has invested, has been in the field of car battery layout for a long time [12]. Many middle- and down-stream manufacturers have also begun to transform, in an effort to not become absent from global supply chains [11–13]. In summary, Chinese manufacturers are expected to focus on the placement strategy of the lithium battery market in the next few years, while Taiwanese manufacturers will mainly focus on a technology-oriented direction [2–13].

In 2017, BYD Company Ltd. announced its future investment direction, focusing on developing low price and new energy vehicles, as well as a cloud-based tracking project. At the same time, BYD wishes to strengthen its investment in the United States [5,6]. With the development of a communication network, BYD will devote most of its energy and financial resources to the development of storage systems and equipment, in order to build up small mobile communication systems in densely populated areas [6,14]. According to BYD's official announcement, the Company will not distribute dividends in 2017 [6]. According to the financial reports of the past two years, the dividend allotments of BYD to its shareholders have been continually declining. Compared with BYD, the Guoxuan High-Tech aggressive builds production lines for positive electrode materials. In the first half of 2017, the company invested 300 million dollars into promoting the development of power battery projects [15]. In addition to expanding their industrial chain, the Guoxuan High-Tech has also invested its surplus into setting up fund companies to invest in new energy technologies. These investment projects result in not only decreasing the allotment of dividends to shareholders, but also halt the allotment of dividends [15].

In Taiwan, the lithium battery manufacturer Chang's Ascending Enterprise Company Ltd. (CAEC) basically does not distribute dividends, but mainly uses capital investment applied to the markets of Uninterruptible Power Supply (UPS) and Light Electric Vehicle (LEV) [13]. In 2017, the company expressed that its future business operations will be driven by steadily growing UPS factory orders [13]. At the same time, CAEC signed a strategic co-operation agreement with the Chinese manufacturer Shandong Wina Green Power Marvell Co., Ltd., in order to integrate their lithium–ion battery industry supply chain [16]. Aside from CAEC, many other lithium battery manufacturers in Taiwan, such as Commscope Co., Ltd., have also constantly reduced or do not even distribute dividends

to their shareholders [13,16]. Considering the above research, lithium battery manufacturers in China and Taiwan generally face a shortage of cash flow-, technology research and development-, and production line investment-related issues. These are important factors affecting the dividend policies of these companies [5,6,13,16]. This also shows that lithium battery manufacturing is not only a technology-intensive industry, but also a capital-intensive business.

1.3. Research Purpose, Framework, and Methodology

The purpose of this research is to explore the decision-making mechanism of a lithium battery manufacturer in formulating dividend policies. In order to achieve the study purposes mentioned above, this study refers to the past literature data and the actual situation, adopting the formal modified Delphi Approach and Fuzzy Analytical Hierarchy Process (FAHP) study methods. The two main motivations of this research are as follows: in China and Taiwan, in order to maximize an enterprise's value, the executive, according to practical requirements, sets up different dividend policies; this is one of the main motivations of the study. A dividend is an extension of the company's surplus and is a tool by which the company shares operating results with shareholders; it is also a symbol of corporate responsibility. In practice, a dividend policy is a signal conveying the company's future operating information. Therefore, investors are provided with more complete information on the dividend policy, for investment reference, which is the other motivation of this research.

In the framework of this research, the first chapter is the introduction, which introduces the industrial background of the lithium battery industry in China and Taiwan, study motivation and purposes, and study framework. The second chapter is the literature discussion, which focuses on how lithium battery manufacturers in China and Taiwan formulate dividend policies, and discusses the literature relating to corporate financial situations, future business plans, shareholder expectations, and decision-making preferences of operators separately. The third chapter provides the study method, explaining the Modified Delphi Approach and Fuzzy Analytic Hierarchy Process. The fourth chapter gives the empirical results and analysis, showing the questionnaire results of two groups of experts in China and Taiwan, and drawing comparisons between them. The fifth chapter is the conclusion.

This research also simultaneously analyzes the decision-making mechanisms related to the dividend policies of lithium battery manufacturers in China and Taiwan. Therefore, this study can address the inadequacies in the past literature. The empirical results of this study not only serve as an important reference for follow-up studies, but can also help investors in enterprises or institutes to understand the issue better, serving as a reference for future decision-making. Moreover, the empirical results of this study also disclose the operating advantages and dilemmas of lithium battery manufacturing-related supply chain manufacturers in China and Taiwan. Thus, this study provides fundamental data for governmental counselling policies in the future.

2. Literature Review

By analyzing dividend policies, a shareholder can determine the rationality of return on investment (ROI) and capital structure. Broadly speaking, dividend policies expose issues such as the date of dividend announcement of enterprises, the dividend payout ratio, and fundraising issues during the dividend payout period. Narrowly speaking, a dividend policy involves the enterprise's retained earnings and the proportion of the payment of common stock dividends. Management authorities should take into full account the investors and the market reaction when formulating a dividend distribution policy.

2.1. Dividend Policy

This research provides a clear and comprehensive understanding of dividend policies by considering the types of dividend policy, the related theory, and their influencing factors. After rearrangement, the famous types and forms of dividend payments, such as residual dividend approach, can be used to formulate the policy; for example, if an enterprise has surpluses and its

capital requirements can be satisfied, it may distribute dividends. Enterprises use long-term surplus forecasts to allocate dividends [17]. Moreover, the stable payout ratio policy considers that enterprises should follow a fixed dividend payout ratio to distribute dividends over a long period of time [18]. However, the link between earnings and dividends weakens as an enterprise develops, such that investors will support repurchase more [18,19]. The most widely circulated bird-in-the-hand theory states that enterprises with high dividend distributions are preferred by investors [19]. As investors are also unable to determine the future developments and operation of the company, they prefer to obtain dividends in advance. In addition, some scholars also mention that, under the perfect capital market, a company's dividend policy does not affect their corporate value [20,21]. In contrast, the information content of dividends theory states that a dividend policy is a message which companies send to the investing public, which is directly reflected in the company's stock price [20–23].

There are many factors which affect dividend policies, comprised of both internal and external factors, which are explored in this study. Among them, the current financial situation of the enterprise, an influencing factor, can not only intuitively reflect the application of funds by the enterprise, but also can change their dividend policy. In addition, the larger the scale of an enterprise is, the stronger its capital dispatch ability is and, so, it will be inclined to release higher cash dividends [18–20]. Business performance also reflects the financial situation of an enterprise. The better the mechanism of corporate governance is, the more inclined an enterprise will be to pay dividends [22,24]. Future operation plans, shareholder expectations, and the decision preferences of executives are certainly also emphasized by this research. The future operation plans of enterprises should assume continued operations; in addition, future growth and earnings expectations also need to be considered. Plans of retaining earnings will affect a company's future development. It was also found that the risk preference of a decision-maker directly influences the formulation of the dividend policy [23,24]. The study of various dividend theories and the influencing factors of dividend policies deliberately involves the mechanisms and processes of decision-making by company executives [19,22–24].

2.2. Influencing Factors of Dividend Policy

Different industries face different investment opportunities and financial management issues. Individual industrial traits affect the cash dividend payout rate among different companies in a given industry [25,26]. There exist a variety of internal and external factors which affect corporate finance and dividend policies. Therefore, the literature review of this study, while simultaneously discussing the development of dividend policy theory, also reviews the literature related to the factors influencing the determinants of dividend policies [23,25,26]. Generally speaking, this research considers that these factors can be divided into different subjects, such as the financial situation of an enterprise, future operation plans, shareholder expectations, and executive decision preference.

2.2.1. Enterprise Financial Status

If a company has a larger scale and better fund dispatch ability, it will have a stronger ability to tolerate risks and is more likely to allot cash dividends; in other words, the larger the scale of an enterprise, the higher its ability to take risks [23,24]. The greater the impact on the cost of capital, the more likely an enterprise will be to pay higher cash dividends. The operation performance of an enterprise within a certain operating period is related to its gains, benefits, and achievements; therefore, the formulated dividend policies of an enterprise are inseparable from the evaluation of business performance. For small-scale and less-profit enterprises, operations achievement will increase after allotting stock dividends [26]. Furthermore, the better the governance mechanism of an enterprise is, the more inclined they will be to increasing dividend payments [26]. In addition, the weaker the shareholder's rights are, the more inclined an enterprise will be towards high dividend allotment [27]. Thus, the dividend policy can absolutely reflect a company's performance, while also providing important information for investors, in order to evaluate whether a company is worthy of investment.

At present, most investors in the capital market pay attention to the profitability and capital turnover ability of enterprises. Broadly speaking, the profitability of an enterprise represents the ability of its capital increment, while the debt ratio affects the capital turnover ability of the enterprise, to a certain degree. Companies with higher profitability can mostly maintain higher debt ratios [28,29]. However, though the debt ratio was negatively correlated with dividend policy, profitability was positively correlated with dividend policy [29]. Also, more profitable companies have more of their own capital [30]. Furthermore, the higher ROA (Return on Assets) of a company is, the greater its ability to allot cash dividends will be [31,32]. In addition, through the operations of cash inflow and outflow, enterprises can intuitively reflect the turnover ability of their funds. Free cash flows can reflect the cash flow created by the company's operations, as well as actually representing the currency that the company can allot to its shareholders; briefly speaking, an increase or decrease in the cash flows affects dividend allotment.

2.2.2. Future Operation Plans and Shareholder Expectations

The prediction of future growth is an important segment in the future operation planning of an enterprise, which indicates the company's operating performance and its prospects for the future. The growth opportunity, called the investment opportunity set (IOS), is composed of an investment plan relating to company growth, which can also be seen as their growth expectation [33]. Not only that, an enterprise allotting dividend is usually required to consider the future surplus of the enterprise. Corporate managers will increase dividends when they are optimistic about future surpluses; if not, they will decrease dividends. Through the studies mentioned, the release of a dividend is positively related to the enterprise's future business plan [33,34].

Based on the premise of the sustainable development of enterprises, when formulating a dividend policy, enterprises should not ignore retaining earnings of their own. The signaling explanation hypothesis mentioned that dividend information theory and confirmed that planning for retained earnings is related to a company's future development [24]. Overall, the retained earnings can be used in various ways; for example, not only for expanding the size of the business and repurchasing shares but also for investing in other enterprises [35]. Operators of enterprises should prudently use their reserved surplus to achieve the maximum profit [33]. Furthermore, enterprise investment decision-making has always been an important component of the operational decision-making of companies. Investors have their own investment decisions, which change with the market; in other words, investors, through studying feasible projects referring to investment objectives in conformity with their expectations, can expect to receive satisfactory investment outcomes [34–37].

In the capital market, through various measures, investors change their investment strategies to make money. Therefore, more and more enterprises have considered the expectations of shareholders when formulating dividend policies. Most investors preferred companies that pay out dividends [36,37]. Moreover, most of them believed that high-dividend portfolios may imply future profit-making information. The study found that investors who preferred stocks were willing to buy stocks from companies that have high dividend policies. On the contrary, investors who preferred capital gains were willing to buy stocks from companies that have lower dividend policies. Investors who preferred cash dividends were willing to pay a higher price to purchase currency dividend stocks. Furthermore, companies with weaker governance and with more regulations restricting shareholders tended to pay out more dividends, which they believed to be a compensatory effect [27]. From the signal hypothesis, we find that, when a company's information is more transparent to investors, more favorable dividends are allotted [38]. Shareholders can understand an enterprise better and, thus, improve the self-discipline behavior of enterprise managers through the transparency of information, consequently increasing dividend payment [39].

2.2.3. Decision-Making Preference of Operators

The decision-making preferences of enterprise managers serve as the starting point for all economic behaviors of enterprises. Therefore, the decision-maker's risk preference has a direct impact on the formulation of the dividend policy. This study considers that the preference for cash dividends, the effect of asymmetric information, the ownership ratio of insiders, and employee dividend policies are all factors that managers pay attention to when making decisions. When adjusting the release of a dividend policy, enterprises consider their reserve surplus, corporate profits, and scale [40,41]. Generally speaking, the internal situation of a company is usually not fully known to investors. Investors can understand the operation situation of business through an increase or decrease of dividend allotment. Corporate borrowing and dividend policy announcements imply a company's expectations of their future operational performance and convey inner information about the company [24,26]. The dividend allotment of a company releases a signal to investors, which can help to reduce information asymmetry between external investors and insiders [40,42]. It can be inferred that the greater the information asymmetry between a company and its outside investors, the fewer dividends a company can allot [23,26,43]. In addition, companies with weaker external and internal governance are more likely to increase their dividend payments [43,44].

However, the issuance of signals from internal and external personnel differs, which also affects the decision-making surrounding dividend policies. Companies tend to pay higher dividends when there is a low shareholding ratio of managers or a higher percentage of external shareholder ownership [44,45]. The study found that, if the ownership concentration is higher, the ration of dividend payout will be adjusted. Companies which have more entrenched managers and higher proxy costs tend to pay dividends and increase the level of dividend payments [41,46]. Employees of enterprises are an important foundation for t. As a result, more and more enterprises have sought to retain talent by paying dividends. In order to attract more money, companies need to build reputations that do not deprive minority shareholders of their interests [47,48]. At the same time, the larger the size of an enterprise, the greater its economy of size, and the higher the number of staffs. In order to combine the interests of enterprises and employees, dividend granting is particularly important. At present, most enterprises in China and Taiwan adopt approaches where employees are shareholders [5–7,11–13]. Companies distribute corporate surpluses to employees, either as cash or allotment, combining employee benefits with corporate profits to enhance corporate financial performance [16–18,46,48].

3. Research Measures and Research Methods

3.1. Application of Modified Delphi Approach

Since its development, the traditional Delphi Approach has been widely used in the fields of humanities and social sciences, such as education, commerce, politics, and the international environment. The Delphi Approach presents the consensus of experts using a statistical method of descriptiveness. The experts do not talk with each other and are not allowed to have horizontal links among them, only being connected to the investigators. Through repeated consultations with the experts, the researchers gradually achieve a decision-making method which has a consistent prediction result. Therefore, the Delphi Approach can be described as a method of prediction and analysis, which has been widely used by social science researchers in modern times. Differing from traditional practices, the Delphi approach omitted the tedious steps relating to the first round; that is, the open-ended questionnaire [49,50]. Through relevant research results, structural questionnaires are developed directly through the relevant research results, planning of the researchers, or the conclusions of expert interviews. The Modified Delphi Approach allows the group of experts involved in the study to focus on the subject, eliminating the guesswork of open questionnaires and increasing the recovery rate of questionnaires [50–52]. Experts involved in the study must provide independent judgments which are not influenced by other experts to ensure that the results of the research are accurate [51–53]. Therefore, when the questionnaires contain professional terms, the respondents or the samples need to

be selected according to their knowledge of the terms and ability to provide reliable answers [49–51]. As the Modified Delphi Approach only includes experts to respond questionnaires, a small sample size is adequate for precision [52–54].

According to the literature and the results of the Modified Delphi Approach, this research builds up a hierarchical analysis structure with respect to the research subject. The financial and non-financial factors in the evaluation mechanism for the dividend policies of Chinese and Taiwanese lithium battery industries are classified as "Financial Status", "Business Plan", "Decision Preference of Business Managers", and "Shareholders' equity" (i.e., four criteria, which have 16 sub-criteria).

Detailed descriptions of these criteria and their sub-criteria are as follows:

(A) Financial status: The current financial situation of the enterprise not only affects the financial decisions of the enterprise, but also the sustainable development of the enterprise. An investor analyzes the financial situation of the enterprise to forecast its future performance and stock price. Therefore, the financial situation is an important factor for an enterprise to consider when formulating a dividend policy. According to the literature, the current financial situation basically includes enterprise dimensions, operating performance and profit, and enterprise value, as well as fund turnover and repayment ability.

- (A1) Enterprise dimensions: the larger an enterprise is, the better its capital turnover capacity and the stronger its ability to undertake risks will be [20]. Therefore, big enterprises should allocate a higher proportion of cash dividends than small enterprises. Enterprises are more inclined to pay cash dividends or stock dividends when they have better profitability and larger dimensions [41].
- (A2) Business performance and profit: business performance refers to the business benefit and performance during the business period. Profit refers to the ability of an enterprise to increase its capital value, which can generate more cash dividends are paid by enterprises with high business performance and surplus [25].
- (A3) Enterprise value: corporate value reflects the time value, risk, and sustainability of corporate capital. Enterprise value is closely related to the financial decisions of an enterprise. Obviously, the higher the value of an enterprise is, the higher the reward to its investors will be. The main reasons that companies choose to pay cash dividends are to attract public investment and to increase the value of the enterprise [55].
- (A4) Capital turnover and liquidity: capital turnover ability not only reflects the speed of enterprise capital turnover but is also an important indicator of its financial situation. By analyzing the capital turnover ability and liquidity ability of enterprises, managers can better deal with assets to improve their business performance. Profitability is positively correlated with dividend policy, while the debt ratio is negatively correlated with dividend policy [29,30].

(B) Business plan: the business plan directly affects the future operational model, management, product development, research and design, and marketing. According to the business design, planning, and specific implementation direction, managers draw up the overall operation plan. Business plans can be subdivided into future market growth, earnings expectation and surplus retention, and investment decisions.

- (B1) Future growth: through market analysis, managers can obtain data about the future growth of the whole industry and their own enterprise. Operators can also explain the expectative achievement of future investment and future outlook of the enterprise to investors. Therefore, future growth opportunity is an important indicator affecting the dividend policies of a company. Growth opportunities can be valuable if the enterprise's return on investment is greater than the necessary rate of return [56].

(B2) Earnings expectations and retained earnings: signaling theory and the information content of dividend hypothesis states that the dividend distribution of enterprises correlates to a positive expectation for future surpluses [24]. Enterprises should maintain a high dividend payout ratio, in order to maximize their stock values [57]. Therefore, dividend policies are also an important part of the long-term financing strategies of enterprises [25].

(B3) Investment decision: a good investment decision is a key factor in the growth of enterprise performance and the improvement of company value. The investment decisions of an enterprise affect fund and resource scheduling, consequently interacting with the dividend policy. If the enterprise decides to increase its surplus proportion in a given year, its cash dividend will be reduced. Investors adopt a diverse range of assessment criterion, including maximum profitability, minimum risk considerations, company financial considerations, and the advice of experts and friends [58].

(C) Decision-making preference of operators: operators control the right of final decision with respect to the enterprise dividend policy. Cash dividend preference, asymmetric information effect, insider ownership ratio, and employee dividend policies may affect the decisions of operators.

(C1) Cash dividend preferences: on the basis of surpluses, dividends and bonuses paid to shareholders in cash form are called cash dividends. The dividend policy may also be influenced by personal preference when the company's operators consider both internal and external conditions and factors; in other words, the operators may decide to increase or reduce the distribution of cash dividends based on personal preferences. Business operators, in order to attract public investment, may prefer to distribute cash dividends [38,55].

(C2) Information asymmetry effects: the Information Content of Dividend Hypothesis is based on asymmetric information, evaluating its impact on corporate financial policies. If the quality of a company is higher, the information asymmetry is lesser and the debt ratio is lower [24]. The more that investors understand the information of the enterprise, the more dividend benefits will be distributed. If a company has more transparent information, its shareholders can understand more about the internal operations and business results, as well as improving the self-discipline of managers and increasing dividend payments [38].

(C3) Internal staff shareholding ratio: the ratio of internal staff shareholding may have a certain influence on the dividend policy of the enterprise [45]. Companies pay higher dividends when managers have a lower shareholding ratio or external shareholders hold a higher shareholding ratio. In addition, when external shareholders have a high shareholding rate, the operators of companies will be affected.

(C4) Employee profit-sharing policy: in order to retain talented employees and improve the morale of staff, enterprises will allocate surplus to employees, through cash or profit-sharing or the allotment of shares, thus promoting their financial achievement. Employee profit-sharing and the sense of belonging to an organization have a positive relationship [59]. Employee dividend allotment not only allows employees to obtain corporate shares at a low cost (or even for free), but also effectively improves enterprise performance [60]. According to the laws of different countries and regions, employee dividend allotment may be presented in different accounts in the corporate earnings.

(D) Shareholder's expectations: under their expectations, shareholders expect to obtain more dividends through a positive method and to reduce the risk of their earnings. Therefore, this study proposes the preferences of main investors, dividend clientele effect, the structure of ownership, liquidity of the market, and the substitution of assets as factors affecting the expectations of shareholders toward the influence of enterprise dividend policies.

(D1) Primary investor preferences: as each investor's risk preference is different, the investor's dividend preference also differs. Investors have different preferences in imperfect capital markets. Some prefer cash dividends, while others prefer stock dividends [56].

(D2) Dividend Clientele Effect: if shareholders are dissatisfied with the dividend policy of an enterprise, the cost of issuance and burden of taxation will be generated when the stocks are resold to other investors [56]. Therefore, in order to satisfy the willingness of shareholders, companies generally do not arbitrarily change their dividend policies.

(D3) Structure of stock rights: the structure of stock rights refers to the proportion of shares in the total share capital of a stock company of different natures and their relationships. The cause of the structure of stock rights may arise from two areas: one is institutional investors and the other is insiders, which is one of the important considerations when formulating a stock dividend policy. An enterprise must finance external capital markets, in accordance with the dividend payments asserted by institutional investors, in order to attract more institutional investors [55].

(D4) Market liquidity: market liquidity refers to the ability of an enterprise-owned asset to fluently become currency at a reasonable price. Market liquidity is an important indicator for measuring whether the market is in good condition or not. By calculating these, one can determine the liquidity of the whole market [39]. If the liquidity of a company's stocks in the market is not high enough, an enterprise may have to use their dividend policy to maintain the attention of market investors.

(D5) Asset substitution: asset substitution refers to the rate of return on assets and the combination of readjusted assets resulting from a risk structure imbalance. Making conversion clauses a part of the straight bonds of companies can solve the issue of debt agents arising from the temptation for venture capital caused by the issuance of direct debt [61]. Creditors claim higher premiums due to asset substitution risk, resulting in an increase in the necessary rate of return for corporate borrowing [62].

3.2. Fuzzy Sets Theory and Fuzzy Analytic Hierarchy Process

When facing various decisions, people need to consider the influence factors at different levels or assessment indicators. Therefore, scholars have developed the study method of Multi-Criteria Decision-Making (MCDM) in order to solve the issues of analysis, assessment, and decision-making [56–58]. This approach can help decision-makers to avoid only considering a single criterion, which cannot lead to a correct, reasonable, and data-based decision. In the study method of studies for MCDM, the Analytic Hierarchy Process (AHP) is an important research method [62]. In the hierarchical structure, the criteria at each level are assumed to be independent. The criterion in a hierarchy should not exceed seven items [63]. The criterion in the previous level can serve as a benchmark for the criterion in a level, using a pairwise comparison method to proceed with the evaluation. When evaluating, preference relations can better satisfy transitivity, which can be shown to be consistent using a consistency test.

The Fuzzy Set Theory was established to solve problems and involves the absence of sharply defined criteria [64,65]. It was first applied to participate in the individual judgments of decision-makers, in order to solve the related problems of decision-making evaluation [66]. Fuzzy theory can be combined with most methods of MCDM. Fuzzy sets use a membership function to describe how an element belongs, to some degree, to a set. In 1983, the Fuzzy Analytic Hierarchy Process (FAHP) is proposed to resolve the issues of subjectivity, imprecision, and vagueness relating to the values in the pairwise comparison matrix in the AHP [67,68].

The numbers applied in this research are triangular fuzzy numbers which calculate the averages of three scoring levels—low, medium, and high–of each sub-criterion to demonstrate the differences among sub-criteria and the range of scores in each sub-criterion. The scores are ranged from equally

important (1, 1, 1) to absolutely important (9, 9, 9), which means that the higher score, the more important the sub-criterion is.

3.3. Robustness Test

In addition to the FAHP, the White Test of heteroskedasticity is conducted to examine the appearance of outliers [69]. The White Test of heteroskedasticity finds the *F*-value which determines whether the variance of the standard errors in a regression model is constant. In addition, the White Test can examine whether any outlier appears in the data in order to ensure the robustness of the empirical research results [70].

4. Empirical Research Results and Analysis

This research first used the Modified Delphi Approach to establish a hierarchical analysis structure. The number of experts (with homogeneous background) required to ensure the consistency of the study is 10 to 15. In order to obtain high-accuracy results, the sample objects of this study are mainly the academic commissioners and enterprise cadres in the lithium battery industry [61–63]. This research issued 31 questionnaires in total. Among these questionnaires, 16 copies were issued to experts in China, of which 15 copies were retrieved; therefore, the overall response rate of effective questionnaires was 93.75%. Moreover, 15 copies were issued to experts in Taiwan, of which 13 copies were retrieved; therefore, the overall response rate of effective questionnaires was 86.67%.

This chapter consists of three parts. The first section uses FAHP to analyze the questionnaires issued to Chinese experts and their empirical results. The second section uses the same method to describe the questionnaires issued to Taiwanese experts. The third section compares and analyzes the questionnaire results between China and Taiwan.

4.1. FAHP Questionnaire Analysis for Chinese Experts

This section focuses on the 15 effective-response questionnaires which used the Modified Delphi approach to carry out the hierarchy structure analysis. The interviewees used the pairwise comparison method to complete the questionnaires. We integrated the expert questionnaires and used FAHP to analyze the evaluation criteria of the decision-making mechanism of dividend policies of lithium battery manufacturers in China. The results of the analysis are shown in the following.

As shown in Table 1, when formulating dividend policies, managers in the Chinese lithium battery industry thought that the first five key sub-criteria for evaluation were: B1, future growth (R value = 0.0933); B2, earnings anticipation and retention of surpluses (R value = 0.0887); B3, investment decisions (R value = 0.0865); A1, scale of enterprise (R value = 0.0798); and A2, business performance and profitability (R value = 0.0751).

Among these five sub-criteria, the larger proportion involved describing the future business plans of enterprises, while the second described financial status. From the above information, lithium battery manufacturers, when formulating dividend policies, tend to consider the future operation plans and financial status of enterprises. Therefore, the most important evaluation sub-criterion for lithium battery manufacturers in China to formulate dividend policies is the future growth of enterprises. Generally speaking, the prediction of future growth of the enterprises is of the most concern to investors, which is also an important factor for enterprise managers when formulating dividend policies [33,55].

Table 1. FAHP questionnaire analysis result for Chinese experts.

Rank	Sub-Criterion	Triangular Fuzzy Numbers	Defuzzification (R) Values
1	B1	(5.59, 6.94, 8.31)	0.0933
2	B2	(5.49, 6.91, 8.26)	0.0887
3	B3	(5.27, 6.59, 8.12)	0.0865
4	A1	(5.11, 6.46, 8.02)	0.0798
5	A2	(5.08, 6.35, 7.99)	0.0751
6	A3	(5.03, 6.34, 7.94)	0.0732
7	A4	(4.90, 6.23, 7.87)	0.0713
8	C1	(4.71, 6.01, 7.52)	0.0691
9	D1	(4.59, 5.88, 7.48)	0.0669
10	C4	(4.29, 5.57, 7.39)	0.0628
11	D2	(4.17, 5.45, 7.24)	0.0614
12	C3	(4.13, 5.42, 7.20)	0.0589
13	D3	(4.04, 5.33, 7.11)	0.0584
14	C2	(3.98, 5.29, 7.02)	0.0583
15	B4	(3.94, 5.25, 6.95)	0.0576
16	D4	(3.91, 5.22, 6.91)	0.0486

The second-most-influential sub-criterion was earnings anticipation and retained surplus. The dividend distribution will be changed with a change of the enterprise's surplus. When managers have a more optimistic attitude towards their earnings expectation, they will increase their dividend payment. Signal Theory confirmed that it is important for enterprises to retain surpluses, which is related to the future development of enterprises [31]. The reason why Chinese lithium battery manufacturers paid more attention to surpluses is that the surplus is the basis of dividend distribution, as well as playing an important role in their future operations. The third-most important criterion was the investment decision. When investors study an enterprise's investment plan, they typically seek an investment target that conforms to their expectations. Investment decisions change with the market [35]. The investment decision of an enterprise not only affects their fund and resource scheduling, but also has a certain influence on the dividend policy [22]. The fourth and fifth sub-criteria were enterprise scale and business performance and profit earning, respectively. Enterprise scale indicates the ability of an enterprise to take risks. The larger the scale of an enterprise's ability to take risks, the greater its impact on funds. The scale of the enterprise has an impact on the formulation of dividend policies [18–20]. In addition, formulating the dividend policy of an enterprise also is inseparable from the evaluation of business performance. The governance mechanism of a company is inclined to increase their dividend payments [22].

In the results of the analysis, the smallest R values were associated to Cash Dividend Preferences (R value = 0.0583), Asset Replacement (R value = 0.0576), and Market Liquidity (R value = 0.0486). This means that these three sub-criteria are mostly not considered by Chinese lithium battery manufacturers. Market liquidity was the least important reference factor when lithium battery manufacturers in China constitute their dividend policies. Market liquidity is an important indicator for evaluating whether the market is in good condition or not. As compared to the surplus, the liquidity of the market has a much smaller influence on the dividend policy of an enterprise. Furthermore, the Assessment of Cash Dividend Preference sub-criterion also received low scores. This result may have arisen from the fact that Chinese companies still extensively use stock dividends. Most companies use the method of dividend allotment to retain talented people, but, for most investors, dividend allotment is a more accepted form. Finally, asset replacement was not a strongly considered sub-criterion by lithium battery manufacturers. The reason for this may be that asset replacement involves asset allocation and the installation of investment combination. However, most investors in capital markets are more concerned about whether businesses are earning profits; briefly, investors tend to prefer highly profitable companies, which results in companies ignoring the issue of asset replacement. Due to the

high risks of asset replacement, as creditors claim higher premiums, the required rate of return of a company with debt leverage will increase [66].

From the White Test for heteroskedasticity, the *F*-value is 8.06 and the *p*-value is 0.00. Since the *p*-value is lower than 0.05, this research concludes that the data gathered from the Chinese experts in each sub-criterion does not appear to have any outliers and the empirical research results are robust.

4.2. FAHP Questionnaire Analysis for Taiwanese Experts

Regarding the subjects of 13 experts from the Taiwanese lithium battery industry, the results of the analyses are shown below.

Table 2 shows that Business Performance and Profitability (R value = 0.1579), Capital Turnover and Solvency (R value = 0.1411), Future Growth (R value = 0.1025), Investment Decisions (R value = 0.0831), and Earnings Forecasts and Retained Surpluses (R value = 0.0823) were the five sub-criteria which obtained the highest weighting scores. The first two of these mainly describe the current financial status of the enterprises, while the other three describe the future operation plans of the enterprises. Through the empirical analysis, when formulating dividend policies, enterprises in Taiwan believe that financial status is the most important criterion. The second-most important criterion was Capital Turnover and Solvency. Lithium battery manufacturers in Taiwan were more concerned about the capital turnover ability and solvency of enterprises, with managers believing that the premise of issuing high dividends is that enterprises should have higher capital turnover ability and high solvency capacity. Therefore, Capital Turnover and Solvency is an important evaluation criterion for lithium battery manufacturers in Taiwan when formulating dividend policies. Furthermore, Lithium battery manufacturers in Taiwan also emphasized two assessment sub-criteria: Future Growth and Investment. The reason for this may be that, from the perspective of managers in Taiwan, an everlasting enterprise may sustainably distribute dividends to its shareholders. Therefore, the future growth of an enterprise lays a solid structure of the implementation of a dividend policy. Adequate investment decisions cannot only increase the profitability of the enterprise, but also yield excess remuneration for the shareholders. The fifth criterion was Earnings Forecasts and Retained Surpluses. The reason for this may be that most Taiwanese companies follow the residual dividend policy theory when formulating dividend policies. Managers consider that the net profit which the enterprise obtains in production and operation after satisfying the fund requirements can serve as the source for dividend distribution.

Table 2. FAHP questionnaire analysis result for Taiwanese experts.

Rank	Sub-Criterion	Triangular Fuzzy Numbers	Defuzzification (R) Values
1	A2	(6.54, 7.92, 8.86)	0.1579
2	A4	(6.51, 7.85, 8.79)	0.1411
3	B1	(6.49, 7.76, 8.68)	0.1025
4	B3	(6.43, 7.72, 8.64)	0.0831
5	B2	(6.33, 7.64, 8.58)	0.0823
6	C2	(6.29, 7.60, 8.54)	0.0685
7	D1	(6.20, 7.52, 8.49)	0.0680
8	C4	(6.14, 7.48, 8.43)	0.0651
9	D2	(6.11, 7.41, 8.34)	0.0607
10	D3	(6.04, 7.28, 8.28)	0.0571
11	C1	(5.98, 7.17, 8.14)	0.0501
12	B4	(5.92, 7.12, 8.05)	0.0451
13	A3	(5.88, 7.07, 8.01)	0.0376
14	D4	(5.84, 7.02, 7.97)	0.0370
15	C3	(5.80, 6.97, 7.93)	0.0369
16	A1	(5.69, 6.87, 7.85)	0.0348

Table 2 also displays the three sub-criterion with minimal R value: Market Liquidity (R value = 0.0370), Internal Personnel Shareholding Ratio (R value = 0.0369), and Enterprise Scale

(R value = 0.0348). Among these, the fact that lithium battery manufacturers in Taiwan pay less attention to the sub-criterion assessment of market liquidity is understandable. Due to the inherent high capital, high profit, and its obvious characteristic of prosperity circulation, market liquidity has little influence on the lithium battery industry and, thus, is not an important evaluation indicator for the formulation of dividend policies. Another minor sub-criterion was the Internal Personnel Shareholding Ratio, indicating that, when the shareholding ratio of managers is lower or the shareholding of external shareholders is higher, companies will allot higher dividends.

From the White Test for heteroskedasticity, the *F*-value is 9.25 and the *p*-value is 0.00. Since the *p*-value is lower than 0.05, this research concludes that, similar to the Chinese experts, the data gathered from the Taiwanese experts in each sub-criterion also does not have any apparent outliers and the empirical research results are also robust.

4.3. Discussion of the Empirical Research Results and Analysis

Comparing the empirical research results of FAHP expert questionnaires between China and Taiwan, this research found that there were some certain discrepancies in the decision-making mechanisms relating to the dividend policies of lithium battery manufacturers in China and Taiwan. In other words, lithium battery manufacturers in both places used different assessment criteria or pointers to formulate their dividend policies.

The empirical research results showed that the evaluation mechanisms for dividend policy formulation by lithium battery manufacturers in China and in Taiwan were obviously different. In formulating dividend policies, Chinese lithium battery manufacturers paid more attention to the future growth of enterprises, earnings expectation and retained earnings, investment decisions, enterprise scale, and operating performance and profit; meanwhile, the results of the study showed that Taiwanese lithium battery manufacturers paid more attention to information asymmetry. By analyzing the decision-making mechanisms relating to the dividend policies of lithium battery manufacturers in China and Taiwan, this research complements the shortcomings in the existing literature. The results of the empirical analysis can help provide a strong reference for subsequent research. Government units, research institutions, and the business community can also take the results of this study as a starting point, for such purposes as the formulation of government policies or internal decision-making, thus serving as an important reference.

5. Conclusions

When formulating dividend policies, Taiwanese lithium battery manufacturers were found to pay more attention to business performance and profitability, capital turnover and solvency, future growth, investment decisions, and earnings forecasts and retained surplus. In comparison, Chinese lithium battery manufacturers, when formulating dividend policies, placed a high value on the future operations of enterprises and the size and performance of the enterprise itself. Taiwanese lithium battery manufacturers based their dividend policy decision-making on corporate profitability and implementation ability to distribute dividends. In addition, as far as the two evaluation criteria of the asymmetric information effect and internal personnel shareholding ratio were concerned, there was a disagreement between the lithium battery manufacturers in the two places.

As far as Chinese lithium battery manufacturers are concerned, under the policy support and market advantage, they seek to constantly increase capital investment, expand productivity, and enhance their competitiveness. Meanwhile, facing the current situation of tripartite confrontation among Japan, South Korea, and China, the Taiwanese lithium battery manufacturers have sought to create a new market, concentrating on new and advanced technologies. Achieving technology transfer and sharing, at same time, the lithium battery manufacturers of Taiwanese have formed a joint research and development alliance in order to achieve the best use of resources. If both governments desire to support their lithium battery industries, expanding their profitability and markets, this research suggests that both governments need to apply industry operation strategies and

competitive advantages. From this research, for the Chinese government, offer subsidies on facilities which enlarging the production capacity should be the priority. For the Taiwanese government, due to the limitation of resources, it should support its industries on research and development for new technologies and products to expand new markets. In short, although the production process is quite similar between lithium battery industries of both countries, the operation and investment strategies for profitability and marketability are different. Therefore, as shown in this research, the governments of both countries should consider the demands and characteristics of their own industries, instead of the ones in the other countries, during policy-making.

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