



Determinants of Agri-food Investment from Fund Managers' Viewpoint

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Abstract

A more welcoming investment environment for the agri-food sector is envisioned as a result of the 2020 Venture Investment Promotion Act and the subsequently revised Act on Creation and Operation of Agricultural, Fisheries, and Food Investment Funds in South Korea. This study seeks to identify strategies to encourage venture investment for agri-food entrepreneurs by relying on these new legal environments. This study uses the Analytic Hierarchy Process to assess factors that facilitate investing based on a survey of fund managers and investment analysts who have invested in agri-food products. The findings indicate that the readiness of agri-food enterprises to adopt corporate-like management practices and their willingness to pursue commercialization are the primary determinants of investment facilitation. Deregulated investment environments and enhanced investor incentive systems rank as the second and third most significant determinants, respectively. The results offer insights into strategic policy initiatives aimed at increasing investment for startups, young entrepreneurs and venture farmers.

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Introduction

When it comes to venture capital investments, the legal environment is crucial, especially in light of the government's efforts to encourage the creation of concrete support for early-stage entrepreneurs, small enterprises, and emerging companies with significant growth potential. The Venture Investment Promotion Act (VIPA) of South Korea has been in force since August 2020 with the aim of creating such an investment ecosystem¹. The subsequent revision of the Act on Formation and Operation of Agricultural, Fisheries and Food Investment Funds (AAFFIF) was made to allow venture capital to invest in the fund's assets and newly accredited accelerators to take part in the fund as venture managers². Notwithstanding the passive aspects of the AAFFIF amendment, it provides a legal framework for creating an environment that attracts investment into the agri-food sectors.

More specifically, since 2010, the AAFFIF has expanded traditional funding instruments that rely on loans and government subsidies into investment forms by providing the investment capital needed to support the growth of agri-food enterprises (AFEs) and startups³. Although capital allocations to AFEs have yielded returns in line with projections, empirical evidence suggests that the performance and return on investment for agricultural ventures have not matched the robust figures observed in the food and processing sectors (Park *et al.*, 2017; APFS, 2020). Notwithstanding these achievements and limitations, the AAFFIF is projected to facilitate private capital influx by promoting investment flexibility via deregulatory measures and amplifying the role of investors. Recent significant enhancements in this domain include the elevated status of accelerators as investors and a Simple Agreement for Future Equity (SAFE), providing startups with a viable mechanism for capital acquisition during initial funding stages (Bell *et al.*, 2016)⁴.

1. The VIPA aims to promote investments in venture businesses and contribute to balanced development of the economy through the establishment of infrastructure for robust growth of venture companies (VIPA Article 1; https://elaw.klri.re.kr/kor_service/lawView.do?hseq=63084&lang=KOR; Access on Nov. 1, 2023).

2. The AAFFIF aim to “contribute to the balanced development of the national economy by promoting investments in the agricultural, fisheries and food industry and laying the foundation for sound growth of agricultural, fisheries and food enterprises” (AAFFIF Article 1; https://elaw.klri.re.kr/kor_service/lawView.do?hseq=47924&lang=ENG; Access on Nov. 1, 2023).

3. AFEs include agricultural and fishery enterprises, food business operators, and companies manufacturing materials of agriculture, fisheries and foods (AAFFIF Article 3).

4. The SAFE is an investment contract between a startup and its investors. When the startup raises a future round of funding, the capital provided by the investor is exchanged for the right to preferred shares. The SAFE sets out terms and circumstances under which the capital will turn into equity. A SAFE has no maturity date or interest accrual,

The crucial question is whether these investment-friendly regulatory changes would genuinely help to revive investment in the agri-food sector. However, existing research regarding the influence of legal and regulatory changes on venture investment is insufficient, and moreover, there are few studies specializing in AFEs (Kim and Kim, 2019; Koo, 2022).

A few aspects that are pertinent to this study should be taken into consideration among the numerous others that contribute to investors' lack of enthusiasm for agri-food investments. First, it is related to an innate investment limitation in agriculture. While investors seek marketability and stability based on short-term economic success, agri-food investments have a strong public aspect, such as long-term growth potential and social value, which may have spillover effects on all of society. Second, because AFEs have distinct corporate structures, venture capital investment methods including purchasing stocks are limited. Even while AFEs have a lot of room to expand and develop in the long run, fund managers usually prioritize short-term stability and profitability over large returns with little risk.

A primary driving force behind this study is to examine the possible impacts of regulatory changes on fund managers' investment decisions for intrinsically disadvantaged AFEs in attracting venture capital. A hierarchy of criteria and options connected to investments is created by breaking down investment decisions using the Analytic Hierarchy Process (AHP). It is anticipated that AHP results would shed light on how AFEs are enhancing their efforts to attract investment.

2. Literature review

Research on laws and regulations pertaining to venture investments has mostly focused on newly introduced financial instruments and their possible effects. For instance, in the nation's intricate venture investment system, Choi and Kim (2018) projected that the VIPA and the establishment of special purpose acquisition companies (SPACs) would provide a more predictable and efficient investment mechanism for venture capital⁵.

in contrast to a convertible note (Westaway, 2023). Since its launch by "Y Combinator" (a US firm) in late 2013, the SAFE has gained enormous popularity in the startup community due to its efficiency, simplicity, and founder-friendliness (de Crescenzo, 2018; Perry *et al.*, 2022).

5. A SPAC is a company with no active commercial operations, established exclusively to raise funds via an initial public offering (IPO). The sole objective of a SPAC is to acquire or merge with a pre-existing company.

Regarding the SAFE, which the VIPA recognizes as a novel venture investment vehicle, a few studies contend that, in accordance with securities legalism, its legal standing needs to be reinforced to safeguard investors' interests (Park, 2018; Park and Cheon, 2018; Yang, 2019; Seong, 2022). Oh and Jeong (2022) commend the application of SAFE to the security-type crowdfunding system for addressing the issue of overvaluing corporation values and supporting market recovery.

According to an empirical analysis by Lee and Cho (2020), redeemable convertible preferred shares (RCPS) are preferred over SAFE in startup cases collected from 2015 to 2019⁶. The same study also emphasized the necessity of striking a balance between ensuring startup profitability and reducing investment risk.

In addition, according to Lee (2019), Korea Venture Investment Corp. (KVIC) should efficiently supervise the company's operations, function, and scope from the standpoint of venture investment management, because KVIC is the nation's leading investment manager and fund-of-funds specialist. AFPS is its equivalent in agri-food investment. Based on the observation that the government finances roughly one-third of established venture investment funds, Nam (2022) makes several recommendations, including revitalizing the private market, privatizing public fund-of-funds, strengthening the capacities and knowledge of organizations that specialize in management, and dissolving funds that are distinct from liquidation.

Numerous studies have been conducted about venture investment decision-making. However, as was previously indicated, not many of these studies have focused on AFEs or relevant changes in legal framework that might facilitate investment.

Table 1 illustrates how venture capitalists make investment decisions based on a variety of characteristics and criteria, including the qualities of entrepreneurs and management team, product and service attributes, market sizes and scopes, financial characteristics, and others. Entrepreneurs' skills and experience, the rate of return, and product/market environments rank among the top investment criteria that are frequently mentioned in the literature (Lee, 2019; Koo, 2022).

6. RCPS combines features of both debt and equity. It is a preferred share because its dividend must be paid before that of common shareholders. It is convertible because the preferred shares can be converted into common shares. It is redeemable because, after a certain period, the issuing company may buy back the shares at a predetermined price.

Table 1 - Selected studies on venture investment decision-making criteria

Characteristics	Criteria	Study
Entrepreneur and management team	Management skills	MacMillan <i>et al.</i> (1987)
	Industry experience	Franke <i>et al.</i> (2006)
	Startup experience	Cassar (2014)
	Degree of commitment	
	Track record	
	Technical qualification	
	Business qualification	
Product and service	Innovativeness	Wells (1974)
	Patentability	Rah <i>et al.</i> (1994)
	Product superiority	Kollmann and Kuckertz (2010)
Market	Market volume	Tyebjee and Bruno (1984)
	Market growth	Mason and Stark (2004)
	Market acceptance	Vinig and de Haan (2008)
	New market	
Finance	Fit to investment strategy	Narayanasamy <i>et al.</i> (2012)
	Return on investment	Lahr and Mina (2016)
	Exit possibilities	Gomper <i>et al.</i> (2021)
Others	Geographic location	Boocock and Woods (1997)
	Network	Baum and Silverman (2004)
	Alliance capital	Wuebker <i>et al.</i> (2015)

Note: Although each study may have several criteria or characteristics, for the sake of simplicity, just one of the criteria is displayed and matched to each study.

Source: Authors.

3. AHP method and data

Hierarchy of investment decisions

The passage of the VIPA and the subsequent revision of the AFFIF provided a legal framework for AFEs, which have traditionally relied on government loans or subsidies, to actively engage in market-friendly investments. The creation of many special purpose funds for primary industries like agriculture and fishery is positive. Fund managers who wish to participate and enterprises with high investment value must be linked in order to create and run a feeder fund. Nonetheless, there is still a perceptual barrier between fund managers and enterprises when it comes to pushing investing.

The three hierarchy criteria that outline the key factors influencing fund managers' investment choices were provided in this study. Four alternatives that are crucial to the hierarchy aim make up each criterion.

These decision-making alternatives and hierarchy criteria were chosen after extensive conversations with fund managers, investment analysts, government departments, AFEs, and the Agricultural Policy Insurance & Finance Service (APFS), as well as research into related literature.

The criteria and hierarchy alternatives for fund managers' investments in agri-food are shown in Table 2. By defining the relative importance of the investment determinants, decision making aims to make investment easier for AFEs. Enhancing AFE capabilities, reducing investment constraints, and strengthening fund manager incentives are established as the top three levels for investment revitalization from the perspective of fund managers.

Table 2 - Criteria and alternatives of hierarchy by fund managers

Criteria	Alternatives
Enhancing AFEs' capabilities	Having agri-food products with potential for commercialization and growth
	Showing corporate-like managerial abilities
	Having farmland and other assets with economies of scale
	Setting up facilities for production, storage, and distribution
Easing the investment environment	Lowering the obligatory investment percentage of feeder funds to improve discretion in fund management
	Lowering the annual obligatory investment percentage to ensure investment liquidity
	Increasing fund-of-funds investment percentage to ease the strain on other investors
	Increasing management fees to ensure fund managers' management stability
Increasing fund manager incentives	Extending incentives to encourage early investment
	Increasing special purpose fund incentives to encourage investment
	Evaluating the incentive programs at KVIC
	Raising performance compensation to encourage risk-taking venture investing

Source: Authors.

The first criterion for enhancing AFE capabilities represents the potential and competitiveness of the investment goal. Commercialized agri-food products, corporate-like managerial abilities, capital sizes, and facilities

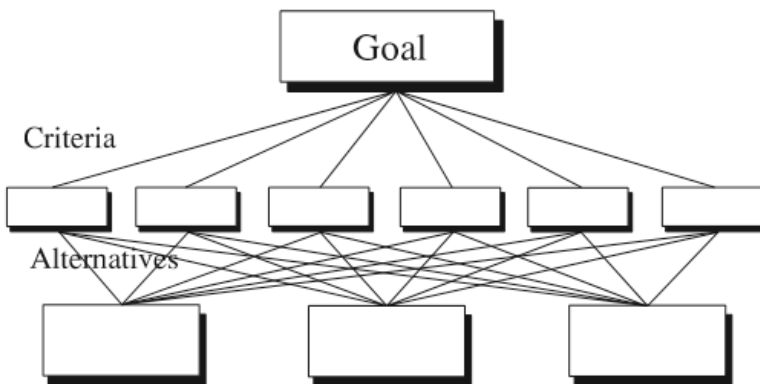
are alternatives that fit the criterion. The second criterion for easing the investment environment comprises of decreasing the mandatory investment ratios of a feeder fund and yearly investment requirements, raising the mandatory investment ratio by fund-of-funds, and increasing management fees, allowing fund managers to actively participate in investing. The third criterion for enhancing fund manager incentives includes extending incentives to encourage early investment, special purpose funds, aggressive venture investing, and benchmarks for similar organizations.

Methods

The AHP, one of decision-making approaches, establishes the hierarchy among the many decision-making elements, including the main goal, criteria, and alternatives. This procedure enables an eventually optimal choice when there are conflicting criteria, incomplete information, or limited resources (Saaty, 1980; 1982). The AHP methodology is widely used for identifying and prioritizing factors that affect venture capitalists' investment decision-making process (Dhochak and Sharma, 2016; Koo, 2022).

The AHP structure in Figure 1 is represented by a three-level hierarchy. An inclusive decision-making process is indicated by level one or goal. This study's main goal is to encourage investment in the agri-food sector. Different criteria and alternatives are provided in more detail at lower levels as one proceeds down the decision-making process.

Figure 1 - A three-level hierarchy



Source: Saaty and Vargas (2012)

A decision maker assigns a weight vector to the set of alternatives, $X = \{x_1, \dots, x_n\}$,

$$w = \{w_1, \dots, w_n\}^T \tag{1}$$

where w_i stands for the alternative x_i 's priorities or weights. An effective way to evaluate several alternatives is to consider two alternatives at a time. The so-called pairwise comparison matrix is where these pairwise comparisons are gathered (Saaty, 1982).

$$A = (a_{ij})_{n \times n} = \begin{pmatrix} a_{11} & \dots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \dots & a_{nn} \end{pmatrix} \tag{2}$$

where $a_{ij} > 0$ indicates the preference rating of x_i over x_j . The ratios between weights are then expressed by each entry of the matrix A.

$$A = (w_i/w_j)_{n \times n} = \begin{pmatrix} w_1/w_1 & \dots & w_1/w_n \\ \vdots & \ddots & \vdots \\ w_n/w_1 & \dots & w_n/w_n \end{pmatrix} \tag{3}$$

The matrix A can be recast as follows since equations (2) and (3) take into account $a_{ij} = 1/a_{ji}, \forall i, j$, a condition of multiplicative reciprocity.

$$A = \begin{pmatrix} 1 & \dots & a_{1n} \\ \vdots & \ddots & \vdots \\ 1/a_{1n} & \dots & 1 \end{pmatrix} \tag{4}$$

As can be seen from this matrix A's simplified structure, if $a_{1n} = 3$, then alternative x_1 is 3 times better than x_n with $w_1 = 3w_n$ (Min, 2015; Lim *et al.*, 2020).

One should use other methods to estimate the priority vector if the decision maker is not perfectly rational and cannot provide exact entries as ratios between weights. The most typical approach makes use of the matrix A's principal eigenvector. Equation (3) multiplied by w results in,

$$Aw = \begin{pmatrix} w_1/w_1 & \dots & w_1/w_n \\ \vdots & \ddots & \vdots \\ w_n/w_1 & \dots & w_n/w_n \end{pmatrix} \begin{pmatrix} w_1 \\ \vdots \\ w_n \end{pmatrix} = \begin{pmatrix} nw_1 \\ \vdots \\ nw_n \end{pmatrix} = nw \tag{5}$$

where n and w refer to an eigenvalue and an eigenvector of the matrix A, respectively. Since the other eigenvalue of A is 0 and it has multiplicity $(n - 1)$,

n is the largest eigenvalue of A . As a result, the following equations can be used to determine the priority vector w 's solution.

$$\begin{cases} Aw = \lambda_{max}w \\ w^T \mathbf{1} = 1 \end{cases} \quad (6)$$

where λ_{max} is the largest or principal eigenvalue of A and $\mathbf{1} = \{1, \dots, 1\}^T$.

Finally, one may include consistency conditions since it is uncommon to be consistent in stating pairwise preferences due to a variety of factors. The Consistency Index for the matrix A or $CI(A)$ is defined in accordance with Saaty and Vargas (2012).

$$CI(A) = \frac{\lambda_{max} - n}{n - 1} \quad (7)$$

This equation states λ_{max} is equal to n if and only if the matrix A is consistent and greater than n otherwise. To compare matrices of different orders, the Consistency Ratio (CR) should be considered.

$$CR(A) = \frac{CI(A)}{RI_n} \quad (8)$$

where RI_n is a real number obtained from a large enough set of randomly generated matrices of size n . Table 3 shows the values of RI_n .

Table 3 - Values of RI_n

n	1	2	3	4	5	6	7	8	9	10
RI_n	0	0	0.5247	0.8816	1.1086	1.2479	1.3417	1.4057	1.4499	1.4854

Source: Saaty and Vargas (2012).

The matrix A should be accepted if the values are $CR < 0.1$ and rejected otherwise. The judgements are 10% less consistent than they would be if they were distributed randomly, according to the standard of $CR < 0.1$.

Data

A total of 232 professionals with expertise administering feeder funds, including fund managers and investment analysts, were surveyed for this study using an arbitrary sample technique. Surveys were sent out through

email from January 25 to February 5 in 2021, and the data was compiled. A total of 35 questionnaires were collected, and 31 of them – with an overall effective response rate of 14 percent – were accepted for analysis after passing consistency verification.

The summary statistics for the sample are shown in Table 4. The respondents’ average age was 47, and they had an average of 13 years of investment experience. These traits suggest that fund managers and investment analysts are in a strong position to voice their opinions on agri-food investment practices and legislative initiatives.

Table 4 - A summary statistics

Element	Average	Minimum	Maximum	Standard deviation
Age	47.4	30	59	8.18
Experience in years	13.2	11	28	7.68

Source: Authors.

In order to guarantee the consistency of the survey data, CR values are calculated and refluxed in accordance with a benchmark of $CR < 0.1$. However, this study permits the survey respondents who are unfamiliar with the AHP method to be included up until $CR < 0.2$ (Saaty and Keams, 1985; Shin *et al.*, 2005). The computed CR values for the survey findings are displayed in Table 5.

The response rate for all responders, 87%, is over the $CR < 0.2$ threshold. The fulfillment response rates are 87%, 94%, and 87%, respectively, based on the criteria. In the case of respondents that did not meet the consistency criteria of $CR < 0.2$, they were re-surveyed, and only data that finally met the consistency criteria were used for analysis.

Table 5 - Computed Consistency Ratio (CR) values (%)

Benchmark	Overall	Criteria		
		Enhancing the capabilities of AFEs	Easing investment conditions	Improving incentives for fund managers
$CR < 0.1$	35	52	42	45
$CR < 0.2$	87	87	94	87

Source: Authors.

4. Analytical results

The relative weights and rankings of the suggested criteria are shown in Table 6. Enhancing AFE capabilities is the most crucial factor in driving agri-food investment out of the three criteria. This finding suggests that potential profitability and managerial aptitude are necessary components of any successful investment in fund managers' perspective. With 0.320, easing investment conditions is given second emphasis. Interestingly, fund managers rank enhancing their own incentives as having the lowest importance, with 0.127.

Table 6 - Relative importance and ranks by criteria

	Criteria		
	Enhancing the capabilities of AFEs	Easing investment conditions	Improving incentives for fund managers
Relative importance	0.553	0.320	0.127
Ranks	1	2	3

Source: Authors.

Table 7 shows the details of relative importance and ranks among alternatives.

Within the criterion of AFEs capabilities, the readiness for corporate-like management and competency is the most important factor with 0.374, followed by the condition of having marketable products. With less than the half ratings of the first alternative, owing farmland and other assets and equipping various facilities are ranked third and fourth, respectively. As for the criteria of easing investment conditions, lowering the investment burden of fund managers through an increase in the ratio of fund-of-funds investment ranks the first with relative importance of 0.461. Other alternatives within the criterion get less than 0.2 point, which indicates a low relative importance in the facilitation of investment. Increase in performance compensation and incentive expansion for special purpose funds get high relative importance among the alternatives fitting the reinforced incentive criteria, with 0.332 and 0.323, respectively. Fund managers have shown less preference for early investing and KVIC benchmark metrics.

The composite weights, which represent the overall priority, are calculated by adding the weights of the three criteria and the 12 alternatives. The

Table 7 - Relative importance(RI) and ranks by alternatives

Criteria	Alternatives	RI	Rank within criteria	Composite weight	Overall rank
Enhancing the capabilities of AFEs	Having agri-food	0.330	2	0.182	2
	Having management skills	0.374	1	0.207	1
	Having farmland assets	0.151	3	0.084	4
	Equipping production facilities	0.145	4	0.080	5
Easing investment conditions	Reducing the investment ratio	0.199	2	0.064	6
	Ensuring investment liquidity	0.185	3	0.059	7
	Increasing fund-of-funds	0.461	1	0.148	3
	Increasing management fees	0.156	4	0.050	8
Improving incentives for fund managers	Encouraging early investment	0.153	4	0.019	12
	Expanding special purpose funds	0.323	2	0.041	10
	Benchmarks for KVIC systems	0.191	3	0.024	11
	Increasing performance compensation	0.332	1	0.042	9

Source: Authors.

alternative that corresponds to AFEs’ readiness for adopting corporate-like management and willingness to pursue commercialization has the highest rank by the composite weight. This shows that, from the standpoint of investors, the capabilities of AFEs in terms of corporate credentials and commercialization potential are the key to maximizing investment success. Second and fourth place, respectively, go to other alternatives relating to the AFE’s capabilities, including whether the AFE has marketable agri-food products. The first alternative says that a company’s capacity to grow and successfully promote its products is closely related to how well it invests. The latter alternative demonstrates the significance of achieving industrial economies of scale supported by farmland and other capital assets.

The sole alternative other than the criteria of AFEs capabilities is noted as an increase in the ratio of investment by fund-of-funds to alleviate the load on other investors among the top five composite weights. This top-priority alternative highlights the significance of increased involvement and role-playing by fund-of-funds as an indicator of public interest.

5. Conclusions and policy implications

The passage of the AAFIF in 2010 was a milestone that broadened the use of conventional policy financing instruments including government subsidies and loans for investment (Park *et al.*, 2017). The agri-food fund-of-funds, which was established to bring together private investors and the government in an investment ecosystem, has acted as a catalyst for venture entrepreneurship and innovation in what was previously thought to be a failing industry (APFS, 2020). Due to their strong reliance on agricultural policies, many AFEs have benefited from or favored the advantages of governmental subsidies or loans, therefore investing is likely to be a relatively new financial tool for the AFEs.

The typical financing hierarchy for AFEs usually prioritizes self-financing or subsidies first, followed by debt or loans, and then stock or investment options (Myers and Majluf, 1984). Since the cost of financing tends to rise with the degree of asymmetric information increases, it is challenging for AFEs to independently access private financial markets (Son, 2013). In fact, there are more than 400 public loan programs for AFEs in the country, most of which offer only tiny sums (Kim and Yoon, 2019). They include the Comprehensive Agricultural Fund (CAF), funds for buying farm equipment, funds for fostering succeeding farmers, and funds for returning locals who establish farms and buy houses in rural areas^{7,8}. On top of the tradeoffs between traditional financing tools and investment, AFEs' independent management and cautious decision-making style make it difficult to accept involvement in management by outside investors or share business interests.

For startups, young entrepreneurs, and venture farmers, however, investment by fund-of-funds can be a beneficial tool because they do not require farmland or other assets as collateral and can lessen the loan load by sharing investment risks. Additionally, the VIPA is anticipated to have a beneficial ripple effect on the operation and performance of agri-food funds by easing regulations on individual specialized investment, enhancing the role of accelerators, and permitting market-oriented tools like SAFE (Choi and Kim, 2018; Lee, 2019).

It is too soon to gauge how the growth of the investment ecosystem will impact investment in the agri-food sector given the short time between the

7. The National Agricultural Cooperative Federation Bank (NACFB) runs the CAF, a governmental lending program. When a farmer requests for a loan, the NACFB gives operating, renovation, agricultural machine, or facility funds after evaluating the farm's viability as a business and managing the operation.

8. Chung *et al.* (2023) provides historical evolution of agricultural finance in Korea and Kim and Kim (2015) suggests potential ways improve the exiting agricultural financial system in the country.

VIPA's passage and the amendment of the AAFFIF that followed. However, since then, encouraging developments in the creation of numerous investment funds have been seen. For instance, the Young Farmers Fund was formed in 2020 and 2021, which invests less than 500 million won in young startups or successors under the age of 49. The Micro Fund also launched investment associations for AFEs that are in the preparation stage of their business or have less than five years of experience. Additionally, a Secondary Fund was established in 2021 to purchase freshly invested assets or a stake in a feeder fund that was invested by agri-food funds. The Business Incubation Fund has begun supporting AFEs with under seven years of experience.

Although the trend so far is positive, more AFEs must be prepared to serve investors' needs in order to promote investment. The AHP analysis suggests AFEs should enhance the management capabilities, and the government and the APFS should ease the requirements for fund-of-funds investments and expand incentives for fund managers. Besides, more legislative attention and support should be given to small-scale AFEs as venture companies with technology and innovation. Strengthening the function of accelerators or further revising the AAFFIF Enforcement Decree that permits the use of Limited Partners Secondary Funds are both desirable in terms of legal restrictions. It is also crucial to increase business and academic collaboration and communication in order to spread awareness of the agri-food fund-of-funds.

Finally, the study's limitations include the relatively small sample size resulting from the survey's focus on fund managers with experience in agri-food investment and the low CR values in the survey's initial round.

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