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The Impact of Aquaculture Cooperation Organization Support on Fish Farmers' Selected Good Aquaculture Practices: Based on a Survey Data of 586 Fish Farmers in China

Wei Yan *, Panfeng Chai and Changbiao Zhong

Business School, Ningbo University, 818 Fenghua Road, Jiangbei District, Ningbo 315211, China; chaipanfeng@sina.com.cn (P.C.); zhongchangbiao@nbu.edu.cn (C.Z.)
* Correspondence: weiyan0574@163.com; Tel.: +86-158-6720-9915

Abstract: This study delves into the significance of integrating small-scale aquaculturists. Through a unique linkage mechanism established between aquaculture cooperative societies and these small-scale practitioners, characterized by mutual risk-bearing and benefit-sharing, there is not only an incentive for the adoption of advanced aquaculture techniques but also an enhancement of the overall quality and safety standards of aquatic produce. Utilizing the ordered probit model, the research sheds light on the profound influence of organizational support in guiding the selection of optimal aquaculture practices. Organizational support is bifurcated into two primary dimensions: emotional support and instrumental support. The empirical results indicate that the dual facets of support provided by aquaculture cooperatives significantly bolster the propensity of aquaculturists to adopt best practices. Specifically, for each unit increase in organizational support, there are marked rises of 12.3%, 17.3%, 18.3%, and 17% in activities including seedling inspection, procurement of quality feed, management of fish diseases, and external fish inspection, respectively. Crucially, the effect of instrumental support surpasses that of emotional backing, positioning it as a more dominant factor in guiding aquaculturists toward embracing optimal practices.

Keywords: aquaculture cooperation organization support; emotional support; instrumental support; selected good aquaculture practices

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1. Introduction

In the wake of China's dynamic economic liberalization, the nation's aquaculture industry has burgeoned, emphatically positioning China as a commanding force in the global aquaculture arena. Despite the robust growth trajectory, the industry grapples with pressing issues related to quality and safety [1]. The Chinese government, acknowledging these challenges, underscored a pivotal shift in the 2021 "Central Government Document No. 1". This document accentuates the imperative of synchronizing fisheries development with the burgeoning public demand for an unblemished aquatic ecosystem and premium-quality aquatic products.

China's aquaculture landscape is markedly characterized by its fragmented structure, predominantly comprising small-scale operations. This fragmentation precludes the establishment of a cohesive, large-scale industrial model [2]. This absence of integration contributes to a palpable deficiency in knowledge dissemination among stakeholders, precipitating notable market inefficiencies. Confronted with a dearth of external incentives, aquaculturists have exhibited reluctance in deviating from entrenched traditional practices [3]. This reluctance is further compounded by pressing issues, including the excessive and indiscriminate use of aquaculture drugs and antibiotics and the arbitrary addition of feed supplements. These practices have not only stymied the sector's economic advancement and posed significant health risks to consumers but have also augmented regulatory scrutiny, adding another layer of complexity to the industry's challenges [4].

In this intricate scenario, the strategic approaches adopted by aquaculturists have emerged as pivotal determinants for assuring the quality and safety of aquaculture products [5]. Empirical research has underscored the substantial impact of cooperative frameworks, particularly professional cooperatives, in seamlessly integrating smallholder aquaculturists into the comprehensive aquatic value chain. Structures such as the "cooperative + aquaculturists" and "enterprise + cooperative + aquaculturists" models are instrumental in cultivating a harmonized strategy encompassing supply coordination, standardized production protocols, rigorous quality assurance, and cohesive brand alignment. These structures play a crucial role in steering practitioners toward adherence to industry benchmarks, thereby enhancing product integrity and bolstering consumer confidence [6–8].

Notwithstanding the existence of an extensive academic literature on agricultural cooperatives, a conspicuous gap has persisted, with a significant emphasis placed predominantly on crop cultivation. This focus has inadvertently marginalized the aquaculture sector. While numerous studies have rigorously explored the interplay between cooperatives and aquatic product quality [9,10], a discernible dearth of research has persisted in probing the nuanced impact of cooperative support on the strategic choice of aquaculture methods. Furthermore, the prevailing research paradigm has exhibited a marked inclination toward qualitative analyses, leaving a vacuum in empirical studies delving into the intricate relationship between cooperatives and the operational practices of aquaculturists.

In light of these observations, this study embarks on a comprehensive exploration of the nuanced effects of Aquaculture Cooperation Organization support on fish farmers' selected good aquaculture practices, offering a fresh perspective and contributing valuable insights to bridge the existing research gaps in this critical domain.

2. Theoretical Analysis

Eisenberger et al. (1990) postulated a nuanced conceptualization of organizational support, drawing from seminal theories such as the reciprocity model and social exchange [11]. This construct aptly encapsulates the organizational ethos of valuing and nurturing its human capital. Within the aquaculture paradigm, the degree and nature of support extended by cooperatives serve as pivotal determinants influencing aquaculturists' engagement and commitment levels. A confluence of scholarly investigations has underscored the pivotal role of aquaculture cooperative support in engendering a sustainable and synergistic integration of aquaculturists within fisheries value chains. This integrative dynamic fosters the emergence of reciprocal psychological contracts, thereby facilitating robust collaborative interfaces pivotal for managing chain relationships. Such interfaces profoundly shape the strategic orientations of both cooperatives and aquaculturists, especially in the realm of aquatic product quality assurance within an embedded collaborative matrix [12]. Empirical trajectories suggest that, upon assimilating cooperative assistance, aquaculturists manifest a heightened sense of stewardship, thereby aligning their actions to resonate with the cooperative's strategic imperatives [13,14]. Augmented organizational support acts as a catalyst, galvanizing aquaculturists to exhibit behaviors and orientations congruent with the cooperative's overarching objectives, thereby amplifying collective efficacy [15,16].

McMillian's seminal exploration discerned emotional and instrumental facets as the cornerstone of organizational support [17]. Instrumental support, characterized by tangible provisions, such as agricultural inputs, labor capital, technical capacitation, and strategic information dissemination [18], serves as an empowerment conduit for aquaculturists, enabling them to navigate informational asymmetries, especially in domains encompassing technical prowess and market dynamics [19]. In contrast, emotional support, characterized by organizational empathy, respect, trust, and attention [20], satiates aquaculturists' intrinsic psychological and socio-emotional requisites [21,22]. When this emotional scaffolding aligns with aquaculturists' aspirational benchmarks, it engenders a heightened trust quotient, culminating in a symbiotic dynamic in which aquaculturists are intrinsically motivated to champion the cooperative's vision.

A granular exploration of the mechanistic underpinnings of organizational support unveils its multifaceted ramifications for aquaculturists' strategic orientations, especially in the adoption of best aquaculture practices, manifested in three cardinal domains.

Informational Equilibrium and Safety Acumen: Fragmented smallholder aquaculturists often grapple with informational lacunae. Coupled with informational disequilibria vis-à-vis upstream stakeholders, these aquaculturists are predisposed to suboptimal procurement decisions. Organizational support recalibrates this dynamic, provisioning quality-centric inputs and fostering an enhanced safety ethos, thereby engendering a paradigm shift toward regulated aquaculture production behaviors.

Emotional Scaffolding and Quality Assurance Propensity: While governmental oversight predominantly leads the agricultural quality assurance domain in China, emergent scholarly trajectories have underscored the profound influence of intrinsic organizational dynamics on this oversight. A robust organizational support framework engenders a climate of mutual trust and reciprocity, leading to synergistic outcomes, especially in the realm of aquatic product quality assurance.

Financial and Technical Capacitation: Cooperatives, by offering requisite financial and technical scaffolding, can significantly mitigate the operational constraints that aquaculturists encounter, thereby galvanizing their proclivity toward best practices.

In light of the aforementioned discourse, this study posits the following hypotheses.

H1. *Organizational support serves as a catalyst, engendering aquaculturists' proclivity toward good aquaculture practices.*

H2. *Emotional scaffolding significantly influences aquaculturists' strategic orientations toward good aquaculture practices.*

H3. *Instrumental support steers aquaculturists toward a paradigm characterized by good aquaculture practices.*

3. Materials and Methods

3.1. The Ordered Probit Model

Considering that the variable related to fish farmers' aquaculture practices attributes studied in this chapter is an ordinal variable and that the data are multi-categorical, discrete, and intrinsically ordered, the ordered probit model is used in this paper to estimate its regression, and the model is constructed in the following form:

$$Y^* = \alpha X + \varepsilon \tag{1}$$

In Equation (1), the explanatory variable Y^* represents the latent variable, which is the effect on fish farmers' selected good aquaculture practices; X represents the explanatory variables, which include the main variables' organizational support, personal characteristics, and family characteristics as control variables; α represents the coefficient of the explanatory variable X; and ε is a random disturbance that is independent of other factors and of the explanatory variable X and fits a normal distribution.

It is assumed that there are uncertainty boundaries between the influencing factors under the role of fish farmers' selected good aquaculture practices: β_0, β_1, $\cdots$ β_{i-1}, and $\beta_0 < \beta_1 < \cdots < \beta_{i-1}$, The relationship between the hidden variable Y^* and the measured value Y is as follows:

$$Y \begin{cases} 0, \; if \; Y^* \leq \beta_0 \\ 1, \; if \; \beta_0 < Y^* \leq \beta_1 \\ 2, \; if \; \beta_1 < Y^* \leq \beta_2 \\ i, \; if \; Y^* \geq \beta_{i-1} \end{cases} \tag{2}$$

In Equation (2), the probabilities of $Y = 0,\ 1\ ,\ 2\ , \cdots\ ,\ i$ are each:

$$\begin{array}{l} prob(Y = 0|X) = prob(\alpha X + \varepsilon \le \beta_0|X) = \phi(\beta_0 - \alpha X) \\ prob(Y = 1|X) = prob(\alpha X + \varepsilon \le \beta_1|X) = \phi(\beta_1 - \alpha X) - \phi(\beta_0 - \alpha X) \\ prob(Y = 2|X) = prob(\alpha X + \varepsilon \le \beta_2|X) = \phi(\beta_2 - \alpha X) - \phi(\beta_1 - \alpha X) \\ \ldots\ldots \\ prob(Y = i|X) = prob(\alpha X + \varepsilon \ge \beta_{i-1}|X) = 1 - \phi(\beta_{i-1} - \alpha X) \end{array} \quad (3)$$

In Equation (3), ϕ represents the density function of the standard normal distribution. We also estimate the parameters in the sequential probit model using maximum likelihood.

3.2. Data

This investigation is predicated upon a meticulously curated questionnaire, targeting aquaculturists in Rongcheng City, Shandong Province, and Xiangshan County, Zhejiang Province. Strategically ensconced along China's eastern littoral, these regions epitomize the burgeoning trajectory of the nation's aquaculture dynamism. As of the current assessment, Rongcheng City and Xiangshan County are home to 78 and 119 specialized cooperative entities, respectively. Evaluating the magnitude of the aquaculture sector, both Shandong and Zhejiang provinces emerge as vanguards, in terms of both volumetric production and expansive cultivation footprint, rendering them quintessential epicenters for a representative academic exploration, thereby offering a holistic purview of China's contemporary aquaculture paradigm.

The selection of representative aquaculture households was underpinned by a tripartite criterion encompassing economic development indices, topographical nuances, and distinct farming attributes endemic to the sampled locales. Leveraging the robust academic and infrastructural scaffolding of two preeminent institutions, China Ocean University and Ningbo University, the research consortium orchestrated extensive liaisons with regional fisheries' governance echelons. To ensure empirical rigor and authenticity, a stratified random sampling modality was employed. Specifically, within each region, five townships (or urban precincts) were earmarked at random. This process was followed by the random selection of six villages within each township, culminating in the random selection of 10 aquaculture households per village.

In both Rongcheng City and Xiangshan County, a total of 300 questionnaires were disseminated, aggregating to 600 across the two regions. Of these questionnaires, 400 were propagated via conventional channels, while the remaining 200 were disseminated through digital conduits, notably "Questionnaire Star". Following the filtration process, which involved the elimination of questionnaires marred by data inconsistencies or lacunae, a corpus of 586 valid responses was curated, translating into an impressive response rate of 97.7%. The questionnaire canvassed a spectrum of dimensions, including the demographic and operational profiles of the aquaculturists, familial business dynamics, affiliations with aquaculture cooperative entities, engagements in contract farming, product quality certifications, deployment of production vectors, adherence to standardized production protocols, green technology adoption, and a comprehensive quality and safety cognizance matrix.

3.3. Variables

1. Dependent Variables (Operationalization of Good Aquaculture Practices)

To encapsulate the multifaceted nature of "good aquaculture practices" among fish farmers, this study employs a quartet of proxy variables, each serving as a pivotal metric.

(a) **Seedling Quarantine Protocols:** This variable pertains to the rigorous inspection and quarantine measures adopted for seedlings before their introduction into the culture environment. Such measures are paramount to preventing the introduction of pathogens and ensuring the health of the stock.

(b) **Nutritional Feed Selection:** Emphasizing the nutritional content during feed selection and procurement is indicative of the farmers' commitment to ensuring optimal

growth and health of the aquatic species. The quality of feed directly correlates with the overall health and yield of the produce.

(c) **Disease Control Regimen:** Regular implementation of disease-control measures, on a monthly schedule, underscores a proactive approach to mitigating potential disease outbreaks, safeguarding both the yield and investment.

(d) **Visual Quality Assurance:** Monthly visual inspections of aquaculture products serve as a rudimentary, yet effective, method for quality assurance, ensuring that the produce aligns with market and health standards.

Responses to these metrics were solicited using a refined Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This ordinal scale ensures a nuanced capture of the respondents' practices and perceptions.

2. Independent Variables (Organizational Support Dynamics)

The linchpin of this investigation is the nuanced construct of "organizational support" emanating from aquaculture cooperatives. Drawing inspiration from seminal works such as Ling (2006), organizational support is dissected into two salient dimensions.

(a) **Emotional Support:** This dimension encapsulates intangible, yet pivotal, facets such as respect, esteem, trust, and care. Such support often fosters a sense of belonging and commitment among the farmers toward the cooperative.

(b) **Instrumental Support:** This dimension is characterized by tangible aids and resources, encompassing agricultural supplies, technical training modules, information-dissemination mechanisms, and sales advisories. These tangible supports directly enhance the operational efficacy of the farmers.

Each of these metrics is meticulously detailed in Table 1, evaluated on an expanded five-point Likert scale. Utilizing the robust analytical capabilities of SPSS software, version 24.0, the Organizational Support Index was meticulously computed for the subset of 229 fish farmers affiliated with aquaculture cooperatives. Preliminary factor analysis, buttressed by a Kaiser–Meyer–Olkin (KMO) measure of 0.831 and a significant Bartlett's test of sphericity, validated the robustness of the dataset. Through principal component analysis (PCA), two dominant factors emerged, cumulatively accounting for a significant 69.43% of the variance. The derived Organizational Support Index amalgamates these insights, offering a holistic measure of the support dynamics. The Organizational Support Index was subsequently derived using the following formula:

$$\text{Organizational support} = (\text{emotional support} \times 35.27\% + \text{instrumental support} \times 34.16\%)/69.43\%$$

Table 1. Variable Description of Organizational Support.

Variable	Indicators	Meaning	Avg	Std	Factor Analysis Results	
					Factor 1	Factor 2
Emotional support	Your aquaculture cooperation organization respects your production decisions	1 = very unconcerned; 2 = not concerned; 3 = fairly concerned; 4 = concerned; 5 = very concerned	3.690	1.160	0.806	0.207
	Your aquaculture cooperation organization values your personal interests		3.904	1.104	0.872	0.157
	Your aquaculture cooperation organization trusts the quality of your products		3.712	1.015	0.813	0.153
	Your aquaculture cooperation organization is there for you in times of need		3.550	1.110	0.811	0.081

Table 1. *Cont.*

Variable	Indicators	Meaning	Avg	Std	Factor Analysis Results	
					Factor 1	Factor 2
Instrumental Support	Your aquaculture cooperation organization provides farming information	1 = never provided; 2 = very rarely provided; 3 = provided but cannot be fulfilled; 4 = conditionally provided; 5 = can be fulfilled	3.445	1.109	0.195	0.815
	Your aquaculture cooperation organization provides technical training		3.480	0.998	0.184	0.797
	Your aquaculture cooperation organization provides information services		3.541	1.066	0.103	0.812
	Your aquaculture cooperation organization provides production and marketing guidance		3.672	1.121	0.104	0.823

4. Control Variables (Extrinsic Influencers)

In alignment with the extant literature and to ensure a holistic analysis, control variables were bifurcated into two broad categories.

Individual Characteristics: This category encompasses the demographic profile of the fish farmer, including gender, age, and education level. Such variables often influence the farmer's receptivity to new practices and adaptability.

Household Attributes: This category delves into the operational dynamics, including household size, aquaculture area, and the cumulative years of experience in aquaculture. These metrics offer insights into the operational scale and expertise of the farming entity.

5. Descriptive Statistics (Data Synthesis)

Of the 586 survey participants, only 263 reported the establishment of aquaculture cooperatives in their vicinity, underscoring the nascent and uneven proliferation of such entities in China. A deeper dive reveals that only 229 fish farmers were active participants in these cooperatives, highlighting potential barriers to engagement or perceived value propositions. Table 2 offers a granular breakdown, delineating the statistical significance, assigned values, and analytical synthesis of each variable. For instance, the mean score metrics offer insights into prevalent practices and their relative adoption among the respondent pool.

Table 2. Descriptive Statistics.

Variable	Indicators	Avg	Std
Seedling quarantine	Your seedlings have passed a rigorous inspection and quarantine before being put into aquaculture: 1 = completely disagree; 2 = disagree; 3 = basically agree; 4 = agree; 5 = fully agree	3.349	1.170
Feed nutrient content	When selecting and sourcing your feed, the first thing you need to consider is the nutritional content: 1 = completely disagree; 2 = disagree; 3 = basically agree; 4 = agree; 5 = fully agree	3.598	1.219
Monthly disease control	Monthly disease control in your aquaculture: 1 = completely disagree; 2 = disagree; 3 = basically agree; 4 = agree; 5 = fully agree	3.563	1.240
Monthly appearance inspection	Monthly appearance inspection of aquaculture products: 1 = completely disagree; 2 = disagree; 3 = basically agree; 4 = agree; 5 = fully agree	3.419	1.263
Selected good aquaculture practices	Average of four production behavior indices	3.483	1.066
Organizational support	Results of the analysis of emotional support and instrumental support factors	3.626	0.743
Gender	Gender of respondent: 0 = male; 1 = female	0.166	0.373
Age	Respondent's age	40.603	8.916
Education level	Respondent's education: 1 primary school and less; 2 middle school; 3 high school or technical school; 4 college; 5 university and more	1.913	0.784
Total family size	Measurements in persons	5.559	1.783
Aquaculture area	Respondents' total aquaculture area, in mu	19.712	4.962
Aquaculture years	Respondents' years of experience in the aquaculture industry, in years	9.498	5.176

6. Results

Using SPSS software, version 24.0, a series of regressions were carried out using the ordered probit model to investigate the effects of the level and dimensions of organizational support on the effectiveness of fish farmers' selected good aquaculture practices, and the results of the specific empirical analyses are presented in Tables 3 and 4.

Table 3. The Influence of Organizational Support on Fish Farmers' Selected Good Aquaculture Practices.

Variables	Quarantine Inspection of Fry	Nutrient Content of Feed	Monthly Disease Control	Monthly Appearance Inspection
Organizational support	0.663 *** (6.495)	0.628 *** (6.181)	0.639 *** (6.288)	0.740 *** (7.136)
Gender	−0.125 (−0.645)	−0.094 (−0.480)	0.276 (1.390)	−0.047 (−0.242)
Age	−0.009 (−1.101)	−0.007 (−0.818)	0.003 (0.416)	−0.010 (−1.281)
Education level	0.385 *** (4.062)	0.318 *** (3.334)	0.179 (1.922)	0.494 *** (5.034)
Total family size	−0.048 (−1.179)	−0.055 (−1.337)	0.005 (0.113)	−0.024 (−0.599)
Aquaculture area	0.049 * (2.147)	0.053 * (2.273)	0.049 * (2.119)	0.046 * (1.971)
Aquaculture years	0.050 * (2.271)	0.027 (1.211)	0.030 (1.370)	0.049 * (2.211)
Likelihood ratio	92.962 ***	71.941 ***	67.290 ***	104.406 ***
McFadden's R^2	0.135	0.105	0.097	0.147
Parallel linearity	19.148 (p = 0.576)	29.072 (p = 0.112)	18.765 (p = 0.600)	30.522 (p = 0.082)
Sample size	229			

Note: *** means significant at 1%; * means statistically significant at 10%; Z-values in brackets.

Table 4. The Influence of Emotional Support and Instrumental Support on Fish Farmers' Selected Good Aquaculture Practices.

Variables	Quarantine Inspection of Fry	Nutrient Content of Feed	Monthly Disease Control	Monthly Appearance Inspection
Emotional support	0.272 ** (3.194)	0.311 *** (3.636)	0.239 ** (2.818)	0.386 *** (4.461)
Instrumental support	0.395 *** (4.459)	0.317 *** (3.597)	0.409 *** (4.603)	0.354 *** (3.978)
Gender	−0.096 (−0.491)	−0.090 (−0.454)	0.320 (1.583)	−0.052 (−0.264)
Age	−0.008 (−1.025)	−0.007 (−0.806)	0.004 (0.513)	−0.011 (−1.289)
Education level	0.397 *** (4.140)	0.319 *** (3.324)	0.195 * (2.066)	0.492 *** (4.980)
Total family size	−0.046 (−1.122)	−0.054 (−1.328)	0.007 (0.177)	−0.025 (−0.607)
Aquaculture area	0.049 * (2.147)	0.053 * (2.272)	0.049 * (2.142)	0.046 * (1.970)
Aquaculture years	0.052 * (2.326)	0.027 (1.216)	0.031 (1.420)	0.049 * (2.200)
Likelihood ratio	93.867 ***	71.954 ***	68.914 ***	104.426 ***
McFadden's R^2	0.137	0.105	0.099	0.147
Parallel linearity	25.208 (p = 0.395)	30.427 (p = 0.171)	22.296 (p = 0.562)	36.019 (p = 0.055)
Sample size	229			

Note: *** means significant at 1%, ** means significant at 5%, and * means statistically significant at 10%; Z-values in brackets.

6.1. Effect of the Level of Support from Aquaculture Cooperation Organization on the Effectiveness of Fish Farmers' Selected Good Aquaculture Practices

Parallel Linearity and the Influence of Organizational Support on Aquaculture Practices:

The empirical landscape of aquaculture practices, influenced by organizational support, is a nuanced domain. To ensure the robustness of the model employed in this study, a preliminary parallel linearity test was conducted. As delineated in Table 3, the resultant *p*-values consistently exceeded the 0.05 threshold. This observation underscores the parallel nature of the regression equations, thereby validating the model's adherence to the parallel linearity assumption.

We delve deeper into the influence of organizational support on specific aquaculture practices.

(a) **Prerelease Quarantine Protocols:** A salient, positive correlation was observed between organizational support and the rigor of prerelease quarantine measures. The regression coefficient stood at 0.663, significant at the 1% level. This outcome suggests that enhanced organizational backing amplifies the likelihood of fish farmers implementing stringent quarantine protocols prior to seedling introduction.

(b) **Nutritional Prioritization in Feed Selection:** Organizational support also manifested a significant, positive influence on the emphasis placed on nutritional content during feed procurement. This relationship, significant at the 1% level, was quantified by a regression coefficient of 0.628.

(c) **Monthly Disease Control Regimen:** The study further highlighted a significant, positive association between organizational support and the adoption of monthly disease control measures, with a regression coefficient of 0.639.

(d) **Visual Quality Assurance:** The influence of organizational support extended to the monthly visual inspection practices as well, with a regression coefficient of 0.740, significant at the 1% level. This metric underscores the commitment to ensuring the visual quality and health of the aquatic produce.

Synthesizing the above findings, it becomes evident that heightened organizational support acts as a catalyst, propelling fish farmers toward the adoption of best practices in aquaculture. Such practices not only enhance the quality and safety of aquatic products but also foster a proactive approach toward sustainable aquaculture. In essence, the overarching influence of organizational support galvanizes fish farmers to be more initiative-driven, culminating in superior aquatic produce quality.

In light of the empirical evidence presented, this study unequivocally supports hypothesis H1, positing a significant, positive relationship between organizational support and the adoption of good aquaculture practices among fish farmers in China.

As fish farmers advance in their educational attainment, they exhibit a more stringent approach to testing and quarantining of seedlings prior to introduction into the farm. This heightened scrutiny is also extended to feed selection, with a pronounced emphasis on the nutritional content, thereby contributing to the production of higher-quality aquatic products. Interestingly, the data suggest that the impact of education on the frequency of aquatic disease control is not significant. This finding could be attributed to the rigorous controls that educated farmers already place on seed placement and feed selection. These preemptive measures likely reduce the incidence of disease during the growth process, diminishing the need for regular aquatic disease control.

With the expansion of aquaculture area, both the risks and costs faced by fish farmers escalate. In response to these increased stakes, farmers are observed to exercise stricter control in the initial stages of the breeding process to safeguard the quality of aquatic products. This strictness includes a heightened focus on inspection and quarantine procedures before releasing fry, meticulous attention to feed quality, and regular monitoring and prevention of fish diseases, all of which are aimed at ensuring the production of quality aquatic products.

Furthermore, as farming tenure increases, fish farmers are observed to place growing emphasis on quality testing and quarantine procedures to ensure the health of fish fry.

This trend is likely driven by the wealth of experience accumulated over time, which has ingrained in these farmers the understanding that the quality of the fry is a critical determinant of the overall quality of the final aquatic products. This seasoned perspective recognizes that only high-quality nursery stock can reduce the likelihood of disease outbreaks during the nursery rearing phase, thereby resulting in a superior aquatic product.

6.2. Effect of the Support Dimension of Aquaculture Cooperation Organization on the Efficiency of Fish Farmers' Selected Good Aquaculture Practices

Before executing the probit regression analysis, a preliminary parallel test was conducted. As delineated in Table 3, the individual regression equations exhibited parallelism, satisfying the prerequisites for the subsequent regression analysis.

Table 4 elucidates the impact of emotional support on various aquaculture practices. Notably, there was a significant, positive correlation between emotional support and both the rigorous inspection and quarantine of aquatic fry prior to their introduction into the culture environment (with a regression coefficient of 0.272) and the monthly disease control measures adopted (with a coefficient of 0.239) at the 5% significance level. Furthermore, the emphasis on nutrient content during feed selection and the monthly appearance inspection of aquaculture products were positively influenced by emotional support, as evidenced by their regression coefficients of 0.311 and 0.386, respectively, at the 1% significance level. These findings underscore the propensity of fish farmers receiving substantial emotional support to adopt enhanced aquaculture practices, thereby optimizing the quality of their aquatic produce to align with market demands.

Instrumental support, on the other hand, exhibited a pronounced influence on a range of aquaculture practices. The practices of stringent pre-introduction inspection and quarantine of seedlings, prioritization of feed nutrition, monthly disease surveillance, and appearance quality checks in aquaculture were all positively correlated with instrumental support, as indicated by their respective regression coefficients of 0.395, 0.317, 0.409, and 0.354 at the 1% significance level. This outcome suggests that bolstered instrumental support equips fish farmers with the requisite resources and knowledge to refine their aquaculture practices, culminating in the production of premium aquatic products.

Furthermore, the data reveal a direct correlation between a fish farmer's educational background and the rigor of his or her aquaculture practices. More educated fish farmers exhibited a heightened diligence in seedling inspection, feed nutrition prioritization, and regular disease and appearance quality checks. Additionally, as the scale of aquaculture operations expands, the inherent risks and operational pressures amplify, prompting fish farmers to accentuate their focus on product quality. Seasoned fish farmers, leveraging their accumulated experience, inherently recognize the importance of preemptive seedling quarantine, ensuring the production of superior aquatic products.

6.3. Marginal Effects of Aquaculture Cooperation Organization on the Control Effects of Fish Farmers' Selected Good Aquaculture Practices

In the progression of our comprehensive analysis, we discerned that the coefficients derived from the probit regression model predominantly encapsulate the influence of the organizational support level on the adoption of optimal aquaculture practices. However, these coefficients scarcely capture the nuanced marginal impacts of such support levels on these practices. Recognizing this limitation, we adopted a marginal effect methodology to elucidate the nuanced influence of each determinant.

Utilizing the advanced capabilities of Stata software, version 17.0, we present the results in Table 4, delineating the marginal effects of organizational support and its bifurcated dimensions—emotional and instrumental support—on the adoption of superior aquaculture practices. A perusal of Table 4 reveals a statistically significant, positive correlation (at the 1% level) between organizational support and its subsequent impact on the adoption of these practices. Both dimensions of support—emotional and instrumental—exhibited a significant, positive influence, corroborating the earlier regression findings and thereby affirming the model's robustness.

We delve more deeply into the specifics.

(a) The marginal effect of organizational support on fry inspection and quarantine stands at 0.123. This finding implies that, with every incremental unit of organizational support, there is a 12.3% enhancement in the likelihood of fish farmers conducting rigorous inspections and quarantines of fry prior to their introduction into the culture environment.

(b) The marginal effect associated with prioritizing feed nutrient content due to organizational support is 0.173. In essence, for every unit increase in organizational support, fish farmers are 17.3% more inclined to emphasize nutritional content during feed selection.

(c) For monthly disease control, the marginal effect of organizational support is quantified as 0.183. This outcome suggests that, with each unit augmentation in organizational support, fish farmers exhibit an 18.3% increased propensity to implement monthly disease control measures.

(d) Last, the marginal effect of organizational support on monthly appearance inspection is 0.170. This finding denotes that, for every unit increment in organizational support, there is a 17% surge in the probability of fish farmers conducting monthly appearance inspections.

Further dissecting the impacts of emotional and instrumental support, Table 5's marginal effects indicate that, for every unit increase in emotional support, fish farmers are 5.3% more likely to implement strict quarantine before seed release, 8.7% more likely to prioritize nutritional content when purchasing feed, 7.3% more likely to undertake monthly disease control in aquaculture, and 9% more likely to maintain consistency in the appearance of farmed fish. In parallel, for each incremental unit of instrumental support, fish farmers are 6.9% more inclined to enforce strict quarantine before stocking, 8.7% more predisposed to consider nutrient content as a pivotal factor in feed purchase, 11% more committed to monthly disease control, and 8.1% more vigilant in conducting monthly appearance inspections of aquaculture products.

Table 5. Marginal Effect of Organizational Support on the Control Effect of Fish Farmers' Selected Good Aquaculture Practices.

Variables	Quarantine Inspection of Fry	Nutrient Content of Feed	Monthly Disease Control	Monthly Appearance Inspection
Organizational support	0.123 *** (5.987)	0.173 *** (6.577)	0.183 *** (6.922)	0.170 *** (7.305)
Emotional support	0.053 *** (3.209)	0.087 *** (3.532)	0.073 *** (3.079)	0.090 *** (4.237)
Instrumental support	0.069 *** (4.242)	0.087 *** (3.568)	0.110 *** (4.557)	0.081 *** (3.953)

Note: *** means significant at 1%;Z-values in brackets.

7. Discussion

The exploration of the aquaculture sector, specifically focusing on the integration of organizational support into fish farmers' practices, is a domain yet to be exhaustively traversed in academic research. This study, aiming to fill this lacuna, meticulously investigates the impact of aquaculture cooperative organizational support on the embrace of optimal aquaculture practices by fish farmers in China. This endeavor is not only an academic exercise but is also a crucial step toward unearthing practical pathways and theoretical frameworks that can substantially elevate the quality and safety standards of aquatic products.

The lack of extensive statistical data within the realms of aquaculture research amplifies the significance of this study's empirical approach. Delving into the aquaculture practices of fish farmers in China, this research not only supplements the existing data pool but also

unravels the intricate mechanisms steering production behaviors, thereby contributing to a more nuanced and comprehensive understanding of the field.

The key findings of this research illuminate the pivotal roles of both emotional and instrumental support from aquaculture cooperative organizations in guiding fish farmers toward the adoption of superior aquaculture practices. While aligning with previous research on the positive impact of agricultural cooperative organizational support [23,24], this study delineates the comparative influence of different types of support. It underscores the more pronounced impact of instrumental support on the enhancement of optimal aquaculture practices compared to emotional support.

Despite the elucidative insights garnered, this research acknowledges the constraints that delineate its scope. The geographic limitation to Rongcheng, Shandong, and Xiangshan, Zhejiang—two significant aquatic breeding provinces in China—might not offer a comprehensive reflection of the diverse and multifaceted Chinese aquaculture landscape. The myriad variables, including regional industrial development, cultural distinctions, and unique environmental contexts, inherently affect the cooperative organizational models and support mechanisms, potentially leading to regional discrepancies in findings.

Recognizing this limitation underscores the imperative for future research to expand its geographical horizon to encompass a more diverse and representative sample of the Chinese aquaculture sector. Such an approach would not only enhance the robustness and generalizability of the findings but also provide a more holistic and panoramic view of the impact of organizational support on aquaculture practices across various regions. This comprehensive perspective is fundamental for the formulation of effective and encompassing policies and strategies that could significantly bolster the aquaculture sector, ensuring its sustainable and equitable growth in alignment with global standards and demands.

8. Conclusions

In conclusion, this extensive research navigates the intricate landscape of aquaculture in China, revealing compelling insights and laying down structured recommendations for bolstering the quality and safety of aquaculture practices within the country.

Emphasis on Structured Coordination: A critical observation of the study underscores the n for a robust and structured coordination mechanism within the aquaculture sector. The fragmented nature of aquaculture in China is a notable hurdle, necessitating the establishment of cohesive and integrated platforms. Aquaculture cooperatives are essential in this regard, ensuring the streamlined allocation and utilization of production factors. Their role in enhancing the bargaining position of affiliated fish farmers, thus ensuring quality and safety right from the initial stages, is pivotal. These cooperatives, with their structured mechanisms, can serve as the linchpin for ensuring optimal coordination and guaranteeing safety and quality standards.

Augmented Organizational Support: The research distinctly highlights the significant role of organizational support in influencing the practices adopted by fish farmers. However, the existing gap, characterized by limited farmer affiliations with cooperatives and the absence of cooperatives in certain regions, is a pressing concern. Addressing this gap necessitates proactive and robust governmental interventions. Enhanced support and guidance for emerging and existing aquaculture entities will undoubtedly strengthen the sector, leading to the widespread adoption of optimal and sustainable practices.

Promotion of Standardized Production: The study's findings reiterate the importance of instrumental support over emotional support in enhancing aquaculture practices. This aspect underscores the need for aquaculture cooperatives to champion the cause of standardized production. By encouraging and facilitating the adoption of standardized production practices and stringent quality and safety measures, cooperatives can play a significant role in ensuring the production of high-quality aquatic products. This support, in turn, will satisfy the growing market demand for premium aquatic products, ensuring the economic viability and sustainability of aquaculture operations.

Final Thoughts: In summary, the path forward necessitates a collective and concerted effort from all stakeholders in the aquaculture sector. The detailed recommendations outlined in this study serve as a comprehensive guide, providing a structured and practical approach for addressing the challenges faced by the industry. The conscientious implementation of these recommendations will not only ensure the sustainability and profitability of aquaculture practices in China but also contribute to the sector's robust growth and global competitiveness. The intertwined and collaborative efforts of governmental agencies, aquaculture cooperatives, and fish farmers are paramount in realizing this vision, leading to a thriving and sustainable aquaculture sector in China.

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References

1. Han, Y. Marine Fishery Resources Management and Policy Adjustment in China Sice 1949. *Chin. Rural. Econ.* **2018**, *405*, 14–28.
2. Huang, Z. Forty Years of Reform and Opening up: Transformation and Prospect of Agricultural Industrial Organization in China. *Agric. Econ. Quest.* **2018**, *467*, 61–69.
3. Chatzimichael, K.; Genius, M.; Tzouvelekas, V. Informational Cascades and Technology Adoption: Evidence from Greek and German Organic Growers. *Food Policy* **2014**, *49*, 186–195. [CrossRef]
4. Tang, Q.; Ding, X.; Liu, S.; Wang, Q.; Nie, P.; He, J.; Mai, K.; Xu, H.; Lin, H.; Jin, X.; et al. Safeguard Measures and Policy Recommendations for Green and Sustainable Development of Chinese Aquaculture. *Chin. Fish. Econ.* **2014**, *32*, 5–11.
5. Lu, Q.; Chen, X. Development of Chinese Fishery Industry in 40 Years of Reform and Opening up and Production Forecast in the 14th Five-year Plan. *J. Shanghai Ocean. Univ.* **2021**, *30*, 339–347.
6. Zhao, L.; Sun, H.; Jiang, H. Research on the Development of New Fisheries Management Subjects Based on the Perspective of Industry Integration. *Guangdong Agric. Sci.* **2019**, *46*, 162–172.
7. Liu, T.; Yuan, P. Are Farmers' Cooperatives Effective Pro-poor Organizations. *Chin. Rural. Econ.* **2020**, *425*, 39–54.
8. Guo, J.; Xiao, J.; He, Y. Research on the Relationship between the Production Specifications, Supply Quality of Farmers' Cooperatives and the Stability of the Supply Chain of the "Farming-Supermarker Docking". *J. Jiangsu Univ. Soc. Sci. Ed.* **2020**, *22*, 40–55.
9. Huang, Z. The Study on Construction of Modern Agricultural Management System and Institutional Innovation. *Rev. Econ. Manag.* **2013**, *29*, 5–16.
10. DeFries, R.S.; Fanzo, J.; Mondal, P.; Remans, R.; Wood, S.A. Is Voluntary Certification of Tropical Agricultural Commodities Achieving Sustainability Goals for Small-scale Producers? A Review of The Evidence. *Environ. Res. Lett.* **2017**, *3*, 033001. [CrossRef]
11. Eisenberger, R.; Fasolo, P.; Davis-Lamastro, V. Perceived Organizational Support and Employee Diligence, Commitment, and Innovation. *J. Appl. Psychol.* **1990**, *75*, 51–59. [CrossRef]
12. Hochwarter, W.A.; Kacmar, C.; Perrewé, P.L.; Johnson, D. Perceived organizational support as a mediator of the relationship between politics perceptions and work outcomes. *J. Vocat. Behav.* **2003**, *63*, 438–456. [CrossRef]
13. Asad, N.; Khan, S. Relationship Between Job-Stress and Burnout: Organizational Support and Creativty as Predictor Variables. *Pak. J. Psychol. Res.* **2003**, *18*, 139–150.
14. Stamper, C.L.; Johlke, M.C. The Impact of Perceived Organizational Support on the Relationship Between Boundary Spanner Role Stress and Work Outcomes. *J. Manag.* **2003**, *29*, 569–588.
15. Farh, J.-L.; Hackett, R.D.; Liang, J. Individual-Level Cultural Values as Moderators of Perceived Organizational Support–Employee Outcome Relationships in China: Comparing the Effects of Power Distance and Traditionality. *Acad. Manag. J.* **2007**, *50*, 715–729. [CrossRef]
16. Huang, J.; Wu, L.; Zhu, L. The Impact of CEO Transformational Leadership Behavior on Middle Managers' Job Performance and Job Satisfaction: The Roles of Organizational Support Perception and Values. *J. Psychol. Sci.* **2012**, *35*, 1445–1452.
17. McMillan, R. *Customer Satisfaction and Organizational Support for Service Providers*; University of Florida: Gainesville, FL, USA, 1997.
18. Aryee, S.; Chay, Y.W. Workplace Justice, Citizenship Behavior, and Turnover Intentions in a Union Context: Examining the Mediating Role of Perceived Union Support and Union Instrumentality. *J. Appl. Psychol.* **2001**, *86*, 154–160. [CrossRef]
19. Jansen JJ, P.; Bosch FA JV, D.; Volberda, H.W. Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Manag. Sci.* **2006**, *52*, 1661–1674. [CrossRef]

20. Shore, L.M.; Wayne, S.J. Commitment and Employee Behavior: Comparison of Affective Commitment and Continuance Commitment with Perceived Organizational Support. *J. Appl. Psychol.* **1993**, *78*, 774–780. [CrossRef]
21. Ling, W.; Yang, H.; Fang, L. Perceived Organizational Support(POS) of the Employees. *Acta Psychol. Sin.* **2006**, *7*, 281–287.
22. Newman, R. APA's Resilience Initiative. *Prof. Psychol. Res. Pract.* **2005**, *36*, 227–229. [CrossRef]
23. Wang, F.; Lin, J. The Influence of Agricultural Leading Enterprises on Quality Safety Behavior of Aquacultural Farmers. *J. Huazhong Agric. Univ. Soc. Sci. Ed.* **2015**, *6*, 11–18.
24. Yang, H. *The Study of Employees' Perceived Organizational Support*; Jinan University: Guangzhou, China, 2003.