Factors Affecting the Growth of Dry Fish Industry in West Bengal : An Empirical Study

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Abstract

Dry fish industry is one of the most significant industries in rural India. India is exporting 200 tonnes of dry fish per year to various parts of the country as well as to Myanmar, Bangladesh, etc. Dry fish is not only consumed by humans, but it is also rampantly used in feeding poultry and broilers firms. This industry is not getting proper opportunity to sell its products not only in the Indian market, but also in the international market as the government has not focused on this market by providing financial and marketing support with licenses to this sector. Millions of poor fishermen who are engaged in the small scale dry fish industry are passing through a very tough situation for their livelihood. Unavailability of few species, absence of storage facilities, lack of rural road infrastructure, lack of facilities of preservation process, insect infestations, absence of product-standard testing facilities, etc. are the biggest issues for this sector. This study attempted to investigate multifarious factors which are affecting the growth of the dry fish industry in India. We also checked the relationship between the growth of the dry fish industry and the overall development of the rural community in India, particularly in West Bengal. The study confirmed the positive relationship between the growth of the dry fish industry and the overall development of the rural community. This study also suggested various recommendations to ensure the growth of the dry fish industry, which would also lead to the development of the rural community in India, particularly West Bengal.

Keywords : **dry fish industry, factors, growth, rural community, West Bengal**

JEL Classification: C12, C31, E21, E24, M20, M31

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Fish drying is a very old practice and is a practical method of preserving fish that have not been immediately consumed or sold in the fresh market. Advanced fishing techniques and improved infrastructure resulted in increased fish catch, better marketing, processing, and curing facilities (Gopakumar, 2002). However, fish drying still remains the cheapest and very popular method of fish preservation (Cutting, 1996; Goswami, Satbiadbas, & Goswami, 2002). Dried products have great demand both within and outside the country due to the high protein content into dry fish products (Balachandran, 2013). Fish drying over the years has grown from a subsistence kind of occupation to a full-fledged prosperous business. Dried fish now caters to different sectors such as quality fish for human consumption, and low value fish for the preparation of fish feed as well as poultry feed. Dry fish industry is one of the fastest growing industries in India.

A large population of our country depends on fishing for their livelihood (Pataik, Baral, & Dash, 2011). Indian states like Maharashtra, Kerala, West Bengal, and Gujarat have huge importance for the fishing industry for the livelihood as well as the development of the state (Government of Assam, Department of Fisheries, 1998). In this

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aspect, SHGs are contributing a lot to protect the interests of the helpless and underprivileged women, which facilitates them to transform their lifestyle (Doley, 2012). Drying fish activities have been associated with the fishing community of Mumbai from a long time. Dried fish is liked by consumers for its excellent taste and uniqueness. India is the second largest fish producing country with a contribution of 5.43% in global fish production and West Bengal has been able to ensure second position among all the States of India (Food and Agriculture Organization of the United Nations, 2012). West Bengal has a coastline of 157.5 km and covers mainly the districts of South and North 24 Parganas and Purba Medinipur (Dan, 1985). India stands at the second position in the world in total fish production after China, with a production of 7.3 metric tonnes in 2007. The annual per-capita consumption of fish in India was estimated at 4.8 kg in 2003. Fish is very important for the economically weaker sections of the population (Sridevi, 1989). It provides a cheap and accessible source of protein and essential micro nutrients. A large section of the population also depends on fish resources (both marine and inland) for their livelihoods, employment, and income (Bavenick, 2001).

Fourteen million people were estimated to be employed in the fisheries sector, which contributed 1.07% to India's gross domestic product (GDP) (Rao, 1991). Fishing is one of the major industries in India as our country has 8,118 km coastal area for fishing. Dry fish industries are most popular industries in rural India. India is exporting 200 tonnes of dry fish to various parts of the country as well as to Myanmar, Bangladesh, etc. In India, there is a huge market demand for dry fish in Odisha, Kerala, West Bengal, Andhra Pradesh, Chhattisgarh, Assam, and the North-Eastern states. It was estimated that over 40 million people are employed worldwide in primary fish production activities (Samanta, Bhaumik, & Patra, 2016).

Statement of the Problem

At present, the dry fish industry is not getting ample opportunity to sell its products not only in the domestic market, but also in the international market because the Government still does not concentrate properly on providing financial and marketing support to this sector. Millions of poor fishermen who are engaged in the small-scale dry fish industry are facing a very tough situation for their subsistence. Sellers who are engaged in trading never get expected profits as they are exploited by the middle men. Availability of few species like mullet, mackarel, and ribbon fish is decreasing day by day because of unchecked fishing in the breeding season, unrestricted fishing by power boats, and insufficient rainfall. These are the upcoming issues for this industry as the Paradeep and Chandinipal regions, which were famous hubs for dry fish centres, are now fighting for survival.

Absence of proper storage facilities, lack of rural road infrastructure, lack of facilities for the preservation process where dry fish may be affected by insect infestations or poor weather conditions, are the major issues. For preventing decomposition in the drying process, dangerous drugs and pesticides are now used. Several complaints come against the dry fish processing plants which are polluting water and the surroundings. Now, the people who are fond of eating delicious foods like dry fish are afraid of hazardous diseases like cancer, gastric ulcer, etc. In many cases in overseas exports, dry fish have been rejected because they contain toxic chemicals. In India, there is no definite set of rules for testing ; so, traders are doing unethical work.

Review of Literature

The dry fish produced in India are graded according to quality. The best quality of the products are suitable for human consumption and are graded for export purposes ; whereas, low quality of dry fish like broken, putrefied, containing sands are generally graded for using in the fish meal industry for making poultry/fish feed. Majority of the 80% fish curers have been making quality dry fish, which are suitable for human consumption.

Saha (1970) mentioned that sun-dried fish is prepared by the artisanal fish curers in West Bengal, and it is

mostly consumed by people outside the state. His study also indicated that the trade is mainly organized for exporting dry fish for human consumption to various states of India. The process of drying involves enzymatic or microbial activity on fresh fish in the presence or absence of salt. The dried product retains most of the nutrient goodness of fresh fish with higher concentrations of proteins, vitamins, iron, and calcium (Govindan, 1985). When packed and stored properly, dry fish has a shelf life of more than two years. Dried fish prepared for human consumption is in great demand both in the coastal as well as interior areas. There is a good export market too available for dry fish. In the interior areas, dry fish forms an important source of animal protein supplement, which is consumed as a main dish or used as a flavouring agent in combination with other staple food items.

Even in the coastal region where fresh fish is in abundance, small shrimps such as Acetes, Whitebaits, Flatfishes, Silverbellies, Small Scads, Lizard fish, and Sciaenids are preferred in the dried form. However, all species of dry fish are in great demand during the fishing ban period when there is a shortage of fresh fish in the market. Care is taken to maintain hygienic conditions when the fish are being dried for human consumption (Das, Prathibha, Maheswarudu, Dash, & Ramana, 2013). Paul, Mitra, De, Sen, Mandal, and Singh (1997) in their study mentioned that for undertaking fish drying activity, the fish curers procure raw materials varying between 10,000 and 70,000 kg/annum. The quantity of procurement of raw material depends mainly upon socio - economic conditions of the fish curers vis- a -vis infrastructure and man power availability (Immanuel & Rao, 2009).

Samanta et al. (2016) reported that lack of capital, lack of proper infrastructure for fish sun drying, crisis of raw material, low market prices, transport problem, and middlemen's interference were the main constraints in the dry fish industry. Fish is highly perishable in nature, and if vendors can prevent spoilage and get a better price, then they will be willing to preserve it. They need access to ice and iceboxes. During the peak season, when ice is in short supply, it is often monopolized by large traders and intermediaries. The costs of fish marketing depend on the species, volume of fish, market distance, market infrastructure, mode of transportation, form of marketed fish, and labour required. The price of fish depends on species, quality, size and weight, season, market structure, supply and demand, and consumption behaviour of consumers. Fish prices are known to follow a seasonal pattern. When supplies are scarce, fish prices increase. In terms of nutritional quality of fish, sometimes dry fish have higher quality standards compared to fresh fish (Payra, Maity, Maity, & Mandal, 2016).

In India, consumption of dried fish is about 32% of the total marine landings, and about 17% of the total catch is used for the production of dry fish. In drying, salt is used to destroy the non-halophilic, spore forming bacteria and osmophilic fungi (Sivaraman & Visnuvinayagam, 2015). High quality dried fish are supplied to foreign dry fish markets like Sri Lanka, Malaysia, Singapore, United Arab Emirates, etc. (Ghorai, Bera, Jana, & Mishra, 2014). Fish is an important part of the regular diet and is a cheap source of protein for the people of West Bengal. In West Bengal, about 78% of the total fish catch is consumed in fresh condition, 6% is used as dry fish, and the rest is used as frozen fish. These dried fish have demand both in the domestic and international markets, and play an important role in employment generation of coastal poor people (The Marine Products Exports Development Authority, 2012). In this aspect, faster economic growth through government liberalization helps to expand the employment opportunities (Sampathkumar & Pradeep, 2017). In spite of accelerating economic growth, the number of rural workforce is decreasing day by day (Rao, 2014).

In this dry fish marketing channel, people involved early in the production chain (fishing and drying) add relatively more value and make little profit due to small scale production, poor product quality, lack of market access, and high transportation cost/toll/taxation, etc. (Nowsad, 2007). Different types of dried fish from all dry fish processing centres of coastal West Bengal like Digha Mohana, Sankarpur, Jaldha, Mandarmoni, Junput, Petuaghat, and neighbouring state of Odisha are usually brought to Egra Regulated Dry Fish Market for auctioning. These dried fish are later distributed to different markets of neighbouring states such as Tripura, Nagaland, Assam, Odisha, Bihar, and Jharkhand, including Bangladesh and Nepal (Food and Agriculture Organization of the United Nations, 1999).

Research Gap

From the literature review, it is evident that limited studies related to the growth of dry fish industry and the determinants of growth in West Bengal have been conducted. It is also observed that no study has been conducted to show the impact of the growth of dry fish industry and the overall development of rural community in India and particularly, West Bengal. Undoubtedly, all the previous studies conducted by the earlier researchers have contributed in their own way but they have also left certain gaps that need to be addressed. This present study is an attempt to investigate multifarious factors, which are affecting the growth of dry fish industry in India. We have also checked the relationship between the growth of the dry fish industry and the overall development of rural community in India, particularly in West Bengal.

Objectives of the Study

The existing reviews of literature have helped us to frame the following objectives in our study. The objectives are as follows :

(1) To explore the determinants or factors which are affecting the growth of dry fish industry in India, particularly in West Bengal.

(2) To find out the degree of influence of the determinants on the growth of the dry fish industry in India and particularly in West Bengal.

(3) To check the relationship between the growth of the dry fish industry and the overall development of rural community in India and particularly in West Bengal.

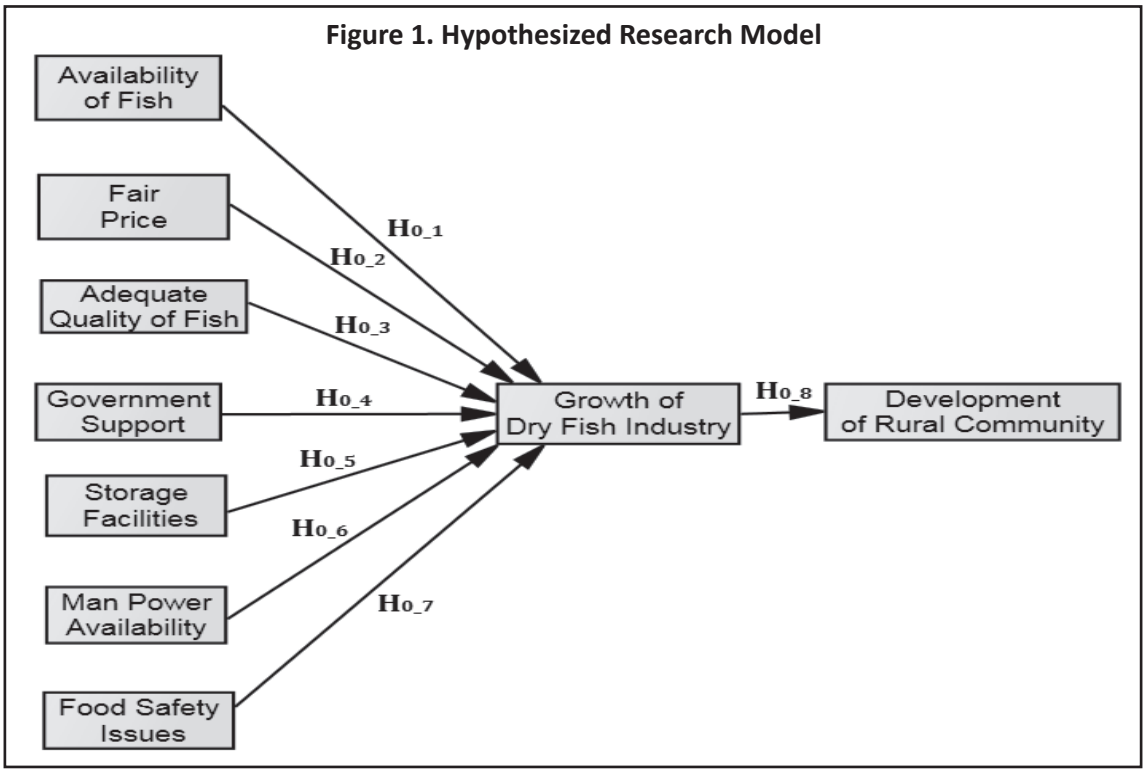
Hypotheses Development

- H_{01}**:** There is no significant difference between 'availability of fish' and 'growth of the dry fish industry'.
- H_{02}**:** There is no significant difference between 'fair price structure in the market' and 'growth of the dry fish industry'.
- H_{03}**:** There is no significant difference between 'adequate quality of fish' and 'growth of the dry fish industry'.
- H_{04}**:** There is no significant difference between 'government support' and 'growth of the dry fish industry'.
- H_{05}**:** There is no significant difference between 'storage facilities for fish' and 'growth of the dry fish industry'.
- H_{06}**:** There is no significant difference between 'man power availability' and 'growth of the dry fish industry'.
- H_{07}**:** There is no significant difference between 'food safety issue' and 'growth of the dry fish industry'.
- H_{08}**:** There is no significant difference between 'growth of the dry fish industry' and 'development of rural community'.

Research Methodology

Here, our research model has been established with the help of both primary and secondary data. The hypothesized research model (Figure 1) was developed by factors collected from literature review as well as interviews of academic experts in the fishery industry. A structured questionnaire was prepared with related

Figure 1. Hypothesized Research Model



variables for the survey (see the Appendix). Most of the constructs and related variables were taken directly from the literature review, and few probable variables were added after discussion with the field experts. A 5 - point Likert scale was used for measuring the responses of people related with the dry fish industry. We targeted the sample elements for our study from two districts (Midnapur and 24-Parganas) in West Bengal through convenience sampling technique. The areas covered under Midnapur district were : Digha, Sankarpur, Jaldah, and Junput. Areas covered under 24-Parganas district were Diamond Harbour, Raidighi, Kakdweep, and Namkhana. For the analysis,186 responses were collected for this study. The survey period was from January 10, 2018 to March 20, 2018.

Analysis and Results

Structural equation modeling has been used for developing the model and establishing the hypothesis by the help of AMOS 20.0 software. Validity and model fitness have been judged through measurement and structural model. Exploratory factor analysis (EFA) by the help of SPSS - 21 describes the questionnaire validation through data reduction method. In this study, KMO and Bartlett's Test (Table 1) show the appropriateness of exploratory factor analysis (EFA).

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.702
Bartlett's Test of Sphericity	Approx. Chi-Square	3233.209
	Df	253
	Sig.	**< 0.001**

Table 2. Overall Reliability Statistics

Cronbach's Alpha	*N* of Items
0.774	**23**

Table 3. Results of Factor Analysis - Rotated Component Matrix [(a)]

Rotated Component Matrix [a]									
	Component								
	Develop _Rural	Labour _Avail	Govt_ Support	Avail _Fish	Growth	Fair _Price	Adequate _Quality	Storage _Facility	Safety _Issues
q23	**0.896**	0.011	0.017	0.152	0.069	-0.043	0.076	0.045	-0.050
q22	**0.878**	-0.150	-0.067	0.112	0.140	-0.004	-0.049	0.013	0.100
q21	**0.859**	-0.039	-0.047	0.152	0.173	-0.022	.0038	-0.023	0.135
q5	-0.055	**0.916**	0.215	-0.095	-0.114	0.116	-0.014	0.015	0.000
q4	-0.085	**0.859**	0.321	-0.126	-0.124	0.130	0.022	0.026	0.008
q6	-0.051	**0.806**	0.037	-0.069	-0.291	0.040	-0.029	-0.006	-0.038
q10	0.018	0.142	**0.920**	0.007	-0.190	-0.075	-0.001	0.066	-0.031
q9	-0.110	0.250	**0.842**	-0.077	-0.048	0.084	-0.094	0.024	-0.130
q11	-0.007	0.117	**0.801**	-0.061	-0.163	0.131	0.138	0.100	0.104
q14	0.152	-0.084	-0.042	**0.886**	0.128	-0.113	0.055	-0.099	0.198
q16	0.054	-0.057	-0.077	**0.868**	0.204	-0.045	0.103	-0.024	0.122
q15	0.307	-0.160	-0.019	**0.812**	0.117	-0.126	0.090	0.010	0.065
q1	0.172	-0.191	-0.106	0.140	**0.899**	-0.048	0.062	-0.065	0.059
q3	0.125	-0.233	-0.138	0.169	**0.831**	-0.025	0.143	-0.025	0.008
q2	0.169	-0.145	-0.261	0.196	**0.748**	-0.265	0.082	-0.016	-0.041
q8	-0.058	0.141	0.073	-0.117	-0.079	**0.947**	-0.012	-0.011	0.082
q7	-0.004	0.090	0.044	-0.107	-0.129	**0.939**	-0.023	0.042	0.012
q13	0.057	-0.037	0.039	0.089	0.070	-0.044	**0.942**	0.049	-0.033
q12	0.003	0.017	0.001	0.109	0.143	0.009	**0.934**	-0.009	0.082
q20	0.001	-0.012	0.052	-0.050	0.007	0.020	0.029	**0.956**	0.051
q19	0.034	0.038	0.109	-0.040	-0.090	0.010	0.011	**0.937**	0.110
q18	0.040	-0.012	-0.016	0.142	-0.013	0.021	0.107	0.094	**0.915**
q17	0.120	-0.015	-0.024	0.175	0.042	0.073	-0.061	0.072	**0.902**
% of Variance Explained	**11.113**	**10.986**	**10.804**	**10.792**	**10.526**	**8.505**	**8.121**	**8.020**	**7.847**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a.] Rotation converged in 6 iterations.

Table 4. Fit Indices of Confirmatory Factor Analysis for Structural Model

Fit Index	Acceptable Threshold Levels	Structural Model Values
χ^2 /*df* (Chi-square / degree of freedom)	Values less than 3	**0.924**
RMSEA (Root mean-square error of approximation)	Values less than 0.06	**0.001**
GFI (Goodness of fit index)	Values greater than 0.90	**0.993**
AGFI (Adjusted goodness of fit index)	Values greater than 0.90	**0.951**
NFI (Normed fit index)	Values greater than 0.90	**0.979**
CFI (Comparative fit index)	Values greater than 0.90	**0.999**

Figure 2. Path Diagram of Hypothesized Structural Model

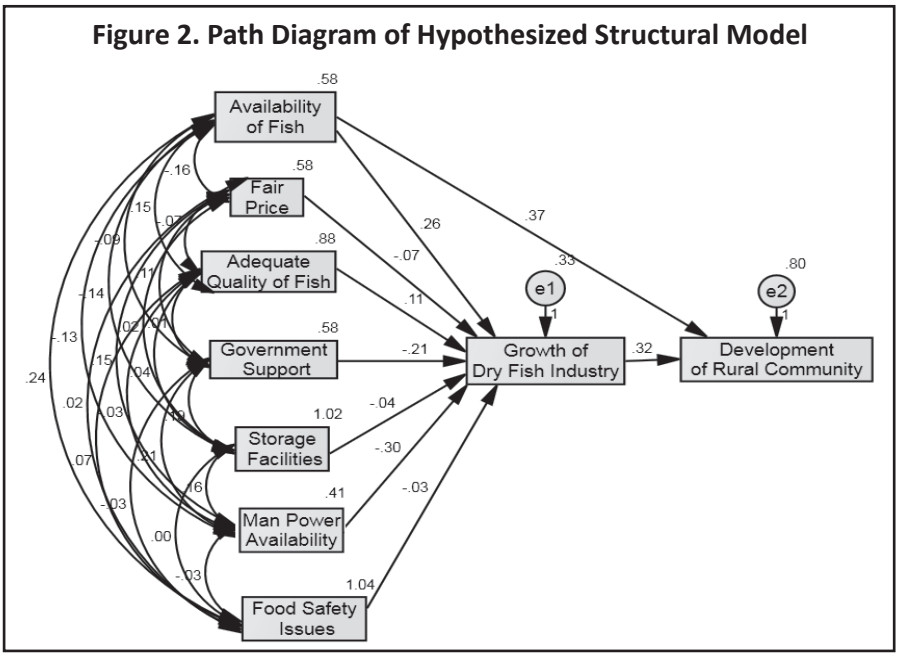


Table 5. Squared Correlations Between Factors in Measurement Model

Factors	Storage _Facility	Growth	Labour _ Avail	Fair_ Price	Govt_ Support	Adequate _Quality	Avail _Fish	Safety _issue	Develop _Rural
Storage _Facility	**0.944**								
Growth	-0.074	**0.848**							
Labour_ Avail	0.002	-0.446	**0.798**						
Fair_ Price	0.043	-0.247	0.242	**0.906**					
Govt_ Support	0.100	-0.330	0.361	0.132	**0.787**				
Adequate _Quality	0.041	0.169	0.035	-0.012	0.002	**0.891**			
Avail _Fish	-0.080	0.390	-0.235	-0.215	-0.165	0.180	**0.853**		
Safety _issue	0.168	0.100	-0.066	0.081	-0.068	0.073	0.320	**0.909**	
Develop _Rural	-0.002	0.358	-0.170	-0.079	-0.127	0.139	0.347	0.189	**0.870**

Note. *Diagonal elements are average variance extracted (AVE).

Table 6. Measurement Model Results

Constructs/ Factors	Variables	Standardized Regression Estimate	Construct Reliability (CR)	Average Variance Extracted (AVE)	Maximum Shared Variance (MSV)	Average Shared Variance (ASV)
Growth of Dry Fish Industry (Growth)	q3	0.839	0.885	0.720	0.199	0.087
	q2	0.82				
	q1	0.885				
Man Power Availability (Labour_ Avail)	q4	0.817	0.840	0.637	0.199	0.060
	q5	0.841				
	q6	0.732				
Fair Price Structure in the Market	q7	0.904	0.901	0.820	0.061	0.025
(Fair_ Price)	q8	0.907				

Government Support (Govt_ Support)	q9	0.775	0.829	0.619	0.130	0.039
	q10	0.827				
	q11	0.756				
Adequate Quality of Fish	q12	0.878	0.885	0.794	0.032	0.011
(Adequate _Quality)	q13	0.904				
Availability of Fish (Avail _Fish)	q14	0.885	0.889	0.728	0.152	0.068
	q15	0.838				
	q16	0.835				
Food Safety Issue (Safety _issue)	q17	0.93	0.905	0.826	0.102	0.025
	q18	0.887				
Storage Facilities for Fish (Storage _Facility)	q19	0.937	0.942	0.891	0.028	0.007
	q20	0.951				
Development of Rural Community	q21	0.885	0.904	0.758	0.128	0.044
(Develop _Rural)	q22	0.865				
	q23	0.861				

Cronbach's alpha for all items (Table 2), which is greater than 0.70, shows the satisfactory range of reliability. Variables with factor loading of above 0.5 lead to the extraction of nine different factors which are extracted from the rotated component matrix. These factors explain a total of 86.714 % of the variation (Table 3). Then, the fitness indexes were checked, and the hypotheses were tested. Confirmatory factor analysis (CFA) was performed for emphasizing on testing how well defined variables represent the factors.

Here, the fit indices (Table 4) of structural model (Figure 2) indicate the acceptable range and prove a good model fit. Higher standardized regression estimates, which are more than 0.7, show higher reliability of the variables. Construct reliabilities (More than 0.7) indicate internal consistency among the variables. As per Hair Jr., Black, Babin, and Anderson (2010) and Field (2009), the following conditions (AVE > 0.5 ; CR > AVE ; MSV < AVE ; ASV < AVE) prove the convergent and discriminant validity in the measurement model. Here, AVE values are also greater than the corresponding squared inter - construct correlation (SIC), so it proves the discriminant validity (Table 5 & Table 6).

↳ **Path Analysis for Hypotheses Testing and Research Findings (refer to Table 7) :** The structural model supports the hypothesis H_{01}, and hence, the hypothesis H_{01} is accepted. The path coefficient is significant ($p < 0.01$) statistically, and it has the expected positive sign (+ 0.261), which means that availability of fish positively influences the growth of the dry fish industry. There is a direct proportional relationship between availability of fish and growth of the dry fish industry. If sufficient fish are available, then it will positively help in the growth of the dry fish industry. Therefore, availability of adequate fish as raw materials should be ensured for the success and survival of the dry fish industry in West Bengal.

The structural model supports the hypothesis H_{02} , and hence, the hypothesis H_{02} is accepted. The *p* - value for the path coefficient from fair price structure in the market is negative (-0.073) and significant ($p < 0.05$), indicating that fair price structure in the market negatively influences the growth of the dry fish industry. It indicates that if fair price structure in the dry fish market is not being determined and maintained, then the dry fish industry will not be in a position to earn its expected profits, which will ultimately affect the growth of the dry fish industry. Therefore, we can say that if the price structure becomes very volatile, then the growth of the dry fish industry will be adversely affected out of this situation.

The structural model supports the hypothesis H_{03} , and hence, the hypothesis H_{03} is accepted. The path coefficient

Table 7. Path Analysis of Structural Model

Measurement Path			Hypothesis	Estimate	S.E.	C.R.	*p*	Hypothesis Assessment
Growth	←	Safety _ Issue	H_{07}	-0.032	0.044	-0.727	0.467	Rejected
Growth	←	Labour _ Avail	H_{06}	-0.302	0.077	-3.947	***	Accepted
Growth	←	Adequate _ Quality	H_{03}	0.115	0.046	2.495	0.013	Accepted
Growth	←	Govt. _ Support	H_{04}	-0.213	0.062	-3.418	***	Accepted
Growth	←	Avail _ Fish	H_{01}	0.261	0.064	4.061	***	Accepted
Growth	←	Storage _ Facility	H_{05}	-0.042	0.044	0.960	0.037	Accepted
Growth	←-	Fair _ Price	H_{02}	-0.073	0.060	-1.212	0.026	Accepted
Develop _ Rural	←	Growth	H_{08}	0.319	0.100	3.173	0.002	Accepted
Develop _ Rural	←	Avail _ Fish	New	0.366	0.095	3.846	***	Accepted

Note. *Significant Regression co-efficient ($p < 0.01$ and 0.05).

is ($p < 0.05$) statistically significant, and it has the expected positive sign (+ 0.115), which means that the adequate quality of fish positively influences the growth of the dry fish industry. It indicates that the growth of the dry fish industry is also dependent on the adequate quality of fish. If adequate quality is being properly maintained, then the market demand of dry fish will increase, and the export of dry fish will also augment due to high quality of dry fish.

The structural model supports the hypothesis H_{04} , and hence, the hypothesis H_{04} is accepted. The *p* - value for the path coefficient from government support to the growth of the dry fish industry is negative (-0.213) and significant ($p < 0.001$), indicating that government support negatively influences the growth of the dry fish industry. Therefore, the hypothesis is supported. If the government does not provide any support in respect of proper road infrastructure, refrigerated transport facilities, regulated dry fish market, export promotional activity, etc., then it will negatively influence the growth of the dry fish industry.

The structural model supports the hypothesis H_{05}, and hence, the hypothesis H_{05} is accepted. The path coefficient is significant ($p < 0.05$) statistically, and it has the expected negative sign (-0.042), which means storage facilities for fish negatively influences the growth of the dry fish industry. If storage facilities of fish are not sufficient and adequate, then there is a high possibility of wastage and spoilage of fish. As a consequence, the dry fish industry will face a tremendous loss of revenue. Therefore, storage facility must be ensured in order to avoid any unwarranted situations.

The structural model supports the hypothesis H_{06} , and hence, the hypothesis H_{06} is accepted. The path coefficient is significant ($p < 0.01$) statistically, and it has the expected negative sign (- 0.302), which means manpower availability negatively influences the growth of the dry fish industry. The dry fish industry requires a huge quantum of manpower for catching, sorting, cleaning, storing, drying, etc. If sufficient and skilled manpower is scarce in the market, then the growth of the dry fish industry is negatively affected.

The structural model does not support the hypothesis H_{07}, and hence, the hypothesis H_{07} is rejected. The *p* -value for the path coefficient from food safety issue to the growth of the dry fish industry is negative (-0.032) but insignificant, indicating that the food safety issue does not influence the growth of the dry fish industry. Therefore, the hypothesis is not supported. Here, we can conclude that people of the dry fish industry are not so much aware about food safety issues of dry fish. Therefore, our statistical results are not significant.

The structural model supports the hypothesis H_{08} , and hence, the hypothesis H_{08} is accepted. The path coefficient is significant ($p < 0.01$) statistically, and it has the expected positive sign (+ 0.319), which means that growth of the dry fish industry positively influences the development of the rural community. A huge number of rural people engage themselves with the dry fish industry in the coastal areas in West Bengal. Fishing is the main

occupation for them. Therefore, the growth of the dry fish industry is directly related with the development of the rural community in the coastal areas of West Bengal.

Research and Policy Implications

It is very clear from our empirical study that the dry fish industry must consider the above stated factors, that is, availability of fish, fair price structure in the market, adequate quality of fish, government support, storage facilities for fish, manpower availability, and food safety issue to ensure the overall growth of the dry fish industry in West Bengal. This study has contributed a conceptual model which can be suggested to the practitioners of this industry and researchers. It will help the dry fish industry in designing its strategies in order to ensure the growth of this sector, which will ultimately develop the rural community in India. At present, the dry fish industry is not getting ample opportunity to sell its products not only in the domestic market, but also in the international market. Millions of poor fishermen who are engaged in the dry fish industry are facing a very tough situation for their subsistence. Therefore, if we can concentrate on the above stated factors, then this industry will definitely overcome the present crisis and will flourish in the days to come. Also, intensive private sector involvement is required to invest more money in infrastructure and marketing initiatives to establish the image or brand of the dry fish industry. On the other hand, the government should be liberal in different policies like tax implications on this sector.

Conclusion

There is a great demand of dried fish in all the coastal areas of India. In addition, there is a good export market available for dry fish. In many coastal areas, dry fish marketing is the only employment opportunity for local fisher women. In West Bengal, fish are cultivated in different types of water bodies like freshwater, brackish water, marine water, and sewage or waste water. The dried fish play an important role in the improvement of socioeconomic condition of the rural areas of West Bengal. Dry fish marketing is a profitable business for small scale dry fish producers of the coastal areas of the Bay of Bengal. The quality of the dried product can be improved by creating awareness among the fishermen to use high quality water and salt. The introduction of simple dry fish equipment like solar or artificial driers for processing can avoid contamination. However, special effort is needed to prevent the use of different harmful pesticides/insecticides during the preparation of dry fish by the State government.

Limitations of the Study and Scope for Future Research

The following limitations should be considered when concluding the findings of the research paper. Possibly, some important previous research papers may have been overlooked by this research and respondents' bias and reluctant behavior may have an influence on the research findings. There are some other limitations of the study that could be addressed in future research. Due to the exploratory nature of the study, only seven factors deemed to be the most important in influencing the growth of the dry fish industry have been included. Another limitation of this study is that it focuses on the dry fish industry and not the entire fish industry. Further studies should utilize this methodology for multifarious segments to confirm the model to ensure that a model is identified for the growth of the dry fish industry. We have only observed the scenario of dry fish industry in the Eastern part of our country. It can also be extended to other parts of our country to identify the significant factors influencing the growth of the dry fish industry.

References

Balachandran, K. K. (2013). *Post-harvest technology of fish and fish product* (pp. 77-104). India : Daya Publishing House.

Bavenick, M. (2001). *Marine resource management: Conflicts and regulations in the fisheries of the Coromandel Coast.* New Delhi : Sage Publications.

Cutting, C. L. (1996). *Fish processing and preservation.* India : H.S. Offset Press.

Dan, S. S. (1985). Marine fishery of West Bengal coast. *Marine Fisheries Information Service, Technical and Extension Series, 63,* 6 - 8.

Das, M., Prathibha, R., Maheswarudu, G., Dash, B., & Ramana, P. V. (2013). An overview of dry fish landings and trade at Visakhapatnam fishing harbour. *Marine Fisheries Information Service; Technical and Extension Series, 215,* 3 - 7.

Doley, S. R. (2012). SHGs for women empowerment with special reference to Khowang Block of Dibrugarh, Assam. *Arthshastra Indian Journal of Economics & Research, 1*(4), 33 - 41. DOI: 10.17010/aijer/2012/v1i4/54536

Field, A. (2009). *Discovering statistics using SPSS (3rd ed.)*. London : Sage Publications Ltd.

Food and Agriculture Organization of the United Nations. (1999). *Future challenges in world fisheries and aquaculture.* 23rd Session of the Committee on Fisheries, Rome, Italy, February 15 - 19, 1999. Retrieved from http://www.fao.org/docrep/meeting/x0070e.htm

Food and Agriculture Organization of the United Nations. (2012). *Global aquaculture production statistics for the year 2011*. Retrieved from www.Fishery/topic/16140/en

Ghorai, S. K., Bera, S. K., Jana, D., & Mishra, S. (2014). Status of the largest dry fish market of East India : A study on Egra Regulated Dry Fish Market, Egra, Purba Medinipur, West Bengal. *International Journal of Current Research and Academic Review, 2* (5), 54 - 65.

Gopakumar, K. (2002). *Textbook of fish processing technology.* New Delhi: Indian Council of Agricultural Research.

Goswami, M., Satbiadbas, R., & Goswami, U. C. (2002). Market flow, price structure, and fish marketing system in Assam - A case study. *Proceedings of National Conference on Fisheries Economics, Extension and Management*. Mumbai : CIFE.

Government of Assam, Department of Fisheries. (1998). *A status report on fishery development on fishery development in Assam*. Assam : Government of Assam.

Govindan, T. K. (1985). *Fish processing technology.* India : Oxford & IBH Publishing Co. Pvt. Ltd.

Hair Jr., J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010). *Multivariate data analysis : A global perspective* (7th ed.). Upper Saddle River, NJ : Pearson Education.

Immanuel, S., & Rao, S. (2009). The status of fisherwomen in Andhra Pradesh. *Indian Journal of Gender Studies, 16* (3), 411 - 423. DOI: 10.1177/097152150901600306

Nowsad, A. K. M. A. (2007). *Participatory training of trainers: A new approach applied in fish processing*. Bangladesh : Bengal Comprint.

Pataik, S., Baral, J. K., & Dash, M. K. (2011). Socio-cultural life of fisherwomen in India - continuity and change (with special reference to Orissa State). *International Journal of Sociology and Anthropology, 3*(10), 340 - 353.

Paul, S., Mitra, P. M., De, D. K., Sen, H. K., Mandal, N. C., Singh, P. (1997). *Winter migratory bagnet fishery of the Hooghly estuary - An economic evaluation.* Technical Bulletin No. 76. Barrackpore, West Bengal: Central Inland Fisheries Research Institute.

Payra, P., Maity, R., Maity, S., & Mandal, B. (2016). Production and marketing of dry fish through the traditional practices in West Bengal coast : Problems and prospect. *International Journal of Fisheries and Aquatic Studies, 4*(6), 118 - 123.

Rao, G. G. (2014). MGNREGA and changes in rural employment trends, wage structure, and rural - urban migration. *Arthshastra Indian Journal of Economics & Research, 3*(5), 7-19. DOI: 10.17010/aijer/2014/v3i5/55991

Rao, P. S. (1991). Traditional trade of fish and aquaculture products in South and Southeast Asia. *Journal of Fisheries Economics and Development, 1*(1), 3 - 25.

Saha, K. C. (1970). Sun-dried fish trade and other fish by-products. In, *Fisheries of West Bengal* (pp. 87 - 89). West Bengal : Department of Fisheries, Government of West Bengal.

Samanta, C., Bhaumik, U., & Patra, B. C. (2016). Perspectives of the dry fish industry in coastal areas of West Bengal, India. *International Journal of Current Research and Academic Review, 4* (3), 63 - 75. doi: http://dx.doi.org/10.20546/ijcrar.2016.403.008

Sampathkumar, T., & Pradeep, V. (2017). Economic reforms and employment growth in India : An empirical analysis. *Arthshastra Indian Journal of Economics & Research, 6* (1), 35 - 45. DOI: 10.17010/aijer/2017/v6i1/111021

Sivaraman, G. K., & Visnuvinayagam, S. (2015). *Microbiological spoilage of dried fishes*. DOI : http://dx.doi.org/10.2139/ssrn.2709070

Sridevi, C. (1989). The fisherwoman financier - A study of status - role nexus in peasant community. *Economic and Political Weekly, 24*(17), April 29, 6-9.

The Marine Products Exports Development Authority. (2012). *India international seafood show at Chennai Trade Centre, Chennai*. Retrieved from http://mpeda.gov.in/MPEDA/admin/app/webroot/files/newsletter/14945 96783Dec11.pdf

Appendix

Factors	Questions on Different Items / Variables
Growth of Dry Fish Industry (Growth)	Fish is available in the coastal areas.
	There is a regulated dry fish market.
	Proper training facility is available.
Man Power Availability (Labour_ Avail)	There is adequate manpower for catching the fish.
	There is adequate manpower for sorting the fish.
	There is adequate manpower for cleaning, storing, and drying the fish.
Fair Price Structure in the Market	Reasonable price of dry fish products is maintained in the market.
(Fair_ Price)	Price is always flexible and uniform in different dry fish markets.
Government Support	Road infrastructure is good for transportation.
(Govt_ Support)	Refrigerated transport facility is available.
	Government is promoting dry fish industry.
Adequate Quality of Fish	Export quality is maintained.
(Adequate _Quality)	Market demand of dry fish is very high.
Availability of Fish	There is adequate availability of fish in coastal areas.
(Avail _Fish)	All types of fish are available.
	Fish are available uniformly throughout the year.
Food Safety Issue	You always sell hygienic products in the market.
(Safety _issue)	Consumers never become ill with dry fish.
Storage Facilities for Fish (Storage_Facility)	There are sufficient number of cold storage units in your area.
	Sufficient space is available in cold storage in the peak season.
Development of Rural Community	You can easily earn your livelihood from dry fish.
(Develop _Rural)	Dry fish industry has changed the lifestyle of this sector related with rural people.
	This sector can generate huge employment in the future for the rural community.

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