

economic evaluation of farmers adaption for raising fish in cages in egypt

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The main objective of the study was to identify those variables related to technological innovativeness in fish cage aquaculture. Different independent variable groups were used. Those groups of variables used were: perception of aquaculturists and demographic attributes; fish cage aquaculture structure (number of cages/relative income); Attributes of fish cage aquaculture; availability of communication channels (awareness stage/adoption stage) ; organizations involved in supporting fish cage aquaculture; fish cage aquaculture activities for local economic development; barriers to fish cage aquaculture; laws and regulations; cage location (governorate); and adoption of fish cage aquaculture. Data of this study were collected during the period February-June, 1997. A pretest was conducted on 30 respondents to fix the study questionnaire. A written questionnaire and few face-to-face interviews were used with a sample of 200 fish cage aquaculturists. The sample was selected under the conditions: respondents should be fish cage farmers, administrators, extension specialists, and investors who have worked in fish cage aquaculture during the past five years; they use modern technologies of fish cage aquaculture; and they should accept to participate in the study, as respondents. Ten questionnaires were excluded because their respondents did not meet the study preconditions. Only one hundred and fifty respondents were identified as the study sample (response rate=75%). The difficulties encountered collecting the study data were very huge due to different reasons including the toxification of fish cages in Dakahlia Governorate; digging of the Salam Canal by which a reasonable number of cages were removed; drying of some parts of Lake Menzala; pollution occurred in some parts of Menzala lake; and the fierce environmental campaign against fish cage aquaculture which was implemented intensively by the Ministry of Irrigation. In addition, it was very difficult to reach some fish cage aquaculturists. Furthermore, the study cost was rocketing. In general, the study examined some individual and environmental/organizational factors that are thought to be related to fish cage aquaculture technological innovativeness. The dependent variable, fish cage aquaculture technological innovativeness, was measured with a scale that sums the level of use of five separate fish cage aquaculture innovations (appropriate nets, buoyant, boats, water resources with appropriate water quality, and appropriate stocking rates). Factor analysis, reliability, frequency, zero-order correlations, and step-wise multiple regressions procedures were used in the analyses. spssjps (Version 6.1) was used in analyzing the data. It was found that the following independent variables were significantly related to innovativeness: (1) Perceptions of fish cage aquaculture by the Egyptian fish cage aquaculturists (the Egyptian fish cage aquaculture will grow/prosper in the near future) are positively related to fish cage aquaculture technological innovativeness ($r=0.23$; $P=.007$). (2) Attitude of fish cage aquaculturists towards the aquatic environment (stopping water pollution is the responsibility of both the government and citizens, chemical pesticides/industrial wastes should not be thrown in water resources, pollution of water resources leads to fish contamination, people should have environmental awareness to protect water resources against pollution, and eating contaminated fish may hurt human health) is positively related to fish cage aquaculture technological innovativeness ($r=0.33$; $P=.000$). (3) Scientific orientation of fish cage aquaculturists (I have to keep trying out new scientific practices, and the best way to compete is to apply the latest scientific research findings) is positively related to fish cage

aquaculture technological innovativeness ($r=0.19$; $P=.028$). (4) Activities for local community development, as a variable, (raising fish in cages helps provide village markets in neighborhood with fish, and raising fish in cages increase awareness/motivation/interest among villagers regarding fish cage aquaculture) are positively related to fish cage aquaculture technological innovativeness ($r=0.40$; $P=.000$). (5) different obstacles (administrative, laws/regulations, different inputs of production, total costs, fish diseases, rodents, net fouling, fish sudden die-offs, and conducting water analyses) are negatively related to fish cage aquaculture technological innovativeness ($r=-0.30$; $P=.000$). (6) Availability of some obstructing laws/regulations is negatively related to fish cage aquaculture technological innovativeness ($r=-0.19$; $P=.028$). (7) Attended formal training by fish cage aquaculturists is positively related to fish cage aquaculture technological innovativeness ($r=0.24$; $P=.005$). (8) Experience of fish cage aquaculturist, in fish cage aquaculture or any other related field, is negatively related to fish cage aquaculture technological innovativeness ($r=-0.17$; $P=.044$). (9) Cosmopolitanism of fish cage aquaculturists is negatively related to fish cage aquaculture technological innovativeness ($r=-0.27$; $P=.001$). (10) Place of living now (governorate where the respondent is living now) is negatively related to fish cage aquaculture innovative technologies ($r=-0.24$; $P=.004$). (11) Fish cage aquaculturist's exposure to face-to-face means of communication at the awareness stage is positively related to fish cage aquaculture technological innovativeness ($r=0.29$; $P=.001$). (12) Some attributes of fish cage aquaculture are positively related to fish cage aquaculture technological innovativeness. They are: 12.1 Observability (its results are obvious during application) is positively related to fish cage aquaculture technological innovativeness ($r=0.20$; $P=.017$). 12.2 Applicability (it is easy to apply fish cage aquaculture in the field) is positively related to fish cage aquaculture technological innovativeness ($r=0.27$; $P=.001$). The most important predictor was found to be activities for local economic community development (COMDEV) which explained 16% of fish cage aquaculture technological innovativeness. The combination of different activities for local economic community development (COMDEV), exposure to face-to-face means of communication at awareness stage (COMCA1), overcoming obstacles/barriers that work against fish cage aquaculture prosperity (OBSTACLE), and applicability of fish cage aquaculture (APPLICA) together explained 32% of fish cage aquaculture technological innovativeness.

5.1. Scope and Limitations of the Study

The study was conducted in ten governorates (38.5% of the country governorates). It encompassed different categories of citizens including fish farmers, investors, administrators, supervisors, and aquaculture extension specialists who are related to fish cage aquaculture. The study took into consideration both individual and environmental/organizational factors and extended to deal with some limited economic criteria. Limitations of this study can be identified as the following: (1) the dependent variable, fish cage aquaculture technological innovativeness, was measured as a composite score of five technological innovations. As a consequence, the innovation process for such innovations was submerged through aggregation into an overall innovativeness' score for each fish cage aquaculturist. Thus, difference in the innovative process among the innovations were lost. This is consistent with Rogers (1983) criticism of innovation research. (2) This study's findings are related to specific geographic locations and individuals and may not be applicable completely to others. The few economic variables used in the study were very few and related to the respondents who have experiences and use innovative technologies in fish cage aquaculture. Therefore, those economic variables had a very limited impact. The study can be considered as a case study under some conditions. Thus, we cannot generalize from only this study. More studies are needed. (3) Number of the participants in this study were small and selected under some conditions. Thus, it is not possible to generalize from the findings. In addition, the study was conducted in a bad situation regarding the distress and loss which some of them experienced through accidental toxification of fish and governmental threat. Therefore, it is recommended to use multi-respondent data gathering design, and multimeasurement approach, or triangulation, at different periods of time. (4) The study did not divide the respondents into categories, based on their innovativeness level. This would have enriched and changed the scope of the study. (5) Despite those previously mentioned limitations of this study, the results confirm the findings of some other studies such as those of Baldrige et al. (1975), El-Ghamrini et al. (1995), and Sawhney et al. (1991). This study also emphasized the need

for studying different social and economic variables and their combined effects on fish cage aquaculture innovativeness.

5.2. Recommendations

It was found, from the study, that technical assistance is needed. Despite the fact that the respondents viewed the different organizations are supporting fish cage aquaculture, it was clear that there are different obstacles (the economic ones are in the least critical), laws/regulations, bad and non-profitable experiences, and difficulties in living near the project locations, it is obvious that technical assistance/training is needed. From the obtained findings, training and scientific orientation were related positively with fish cage aquaculture technological innovativeness. In this sense, training should work in parallel with creating and deepening scientific attitudes among fish cage aquaculturists. The majority of respondents ranked the General Authority for Fish Resources Development as the first among those organizations involved in supporting fish cage aquaculture. The General Authority for Fish Resources Development is responsible for all water resources in Egypt. The finding implies that there is some symbiotic relationships between the industry and concerned organizations. In this sense, this bond should be strengthened and supported for the mutual benefits of the two parties. The General Authority for Fish Resources Development, and a local research organization, could involve fish cage aquaculturists in technical updates and site visits to help fish cage aquaculturists to become competent in production aquaculture and the scientific principles of fish cage aquaculture. Site visits and tours of facilities would also be helpful for them. Fish cage aquaculture activities for local community economic development implies the importance of mutual benefits and horizontal linkages between fish cage aquaculture and local communities around them. These relationships should be strengthened. Resources play a significant role in fish cage aquaculture. Despite the fact that resources proved, from the finding, to be not related to fish cage aquaculture innovativeness as a consequence of taking the study sample under some conditions, the researcher observed that almost all the participants refused primarily to provide any information about relative income and their resources and they mentioned it in a way reflected some doubts. It is very important to build confidentiality and trust between fish cage aquaculturists and the extension service. Fish cage aquaculturists should be rewarded for their innovativeness and productivity. The Ministry of agriculture, Agricultural Professions, fisheries cooperatives, and aquaculture cooperatives should develop procedures to recognize and reward innovative fish cage aquaculturists who adopt new forms of innovative technology with the goal of improving their production. It is also very important to find ways to avoid water pollution accrued from implementing fish cage aquaculture. It is the shared responsibility of both fish cage aquaculturists and the government.

5.3. Implications

Fish cage aquaculture technological innovativeness is characterized by small number of highly qualified, scientific oriented fish cage aquaculturists; effective means of communication emphasizing the role of face-to-face or interpersonal communication; tendency to play an active role in local economic community development; some important attributes of fish cage aquaculture that combine those attributes of observability and compatibility are identified as the most important attributes that play important role in its adoption process. It may be that individuals who are innovative in adopting fish cage aquaculture are also innovative when it comes to other areas of agricultural science and technology. Since aquaculture is taught in relatively few high schools, colleges, research institutes and concerned organizations, fish cage aquaculturists need assistance in improving their knowledge and skills in this profession. This can be achieved through technical training and providing enough resources for this promising field. Adopting scientific principles by fish cage aquaculturists may help to alleviate their uncertainty and allow them to accept risk, both of which are important individual attributes related to technological innovativeness. Exposure to face-to-face means of communication seems to be very important in diffusing fish cage aquaculture. It was proven to be related to fish cage aquaculture technological innovativeness. In fact, it was more important than mass media. Exposure to face-to-face means of communication should be strengthened and emphasized. Assisting fish cage aquaculturists overcome different obstacles and barriers that make it difficult for this profession to prosper and flourish was proved to be of utmost importance in diffusing fish cage aquaculture. Overcoming obstacles facing this industry was related to fish cage aquaculture technological innovativeness. This study attempted to examine some of the different variables that may be related to fish cage aquaculture technological innovativeness using personal and

different organizational/environmental factors. Perhaps the findings of this study will assist policy makers as they consider appropriate policies, laws, regulations to push this promising profession forward. This chapter explained limitations of the study, recommendations of the study, and implications of the study. The following pages will include the used references, acknowledgment, and appendices. The appendices will include the used questionnaire, the attached letter to the questionnaire, and the Arabic abstract.