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Technical performance of Plant Clinics as providers of crop protection services: The case of Guilan Province, Iran

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ABSTRACT

Plant Clinics offer significant services to small-scale farmers in terms of crop protection advice in many developing countries, but research pertaining to the technical performance of Plant Clinics as providers of crop protection services is limited. The present study evaluated the performance of Plant Clinics in Guilan Province of northern Iran by data envelopment analysis (DEA). Data were collected through a structured questionnaire from paddy farmers and the executives of eighteen Plant Clinics in Guilan Province in northern Iran. Most Plant Clinics (61.1%) covered an area from 400 to 800 ha and most (83.3%) served up to 800 farmers, issuing between 1 and 50 prescriptions annually. The number of staff in the majority of Plant Clinics (55.6%) was between 5 and 10 people. Most Plant Clinics (55.6%) had an annual income between 150 and 250 million Iranian rials (IRR). Among 18 Plant Clinics studied, nine units had efficient performance, whereas the remaining showed inefficient operation. Efficient units tried more to absorb resources, to optimally allocate them, and to provide optimum services. Moreover, efficient units were more oriented towards clients' satisfaction and income promotion, which improved the units' efficiency. Benchmarks were then determined for the inefficient Plant Clinics, so that the managers of those clinics can have insights into the status of those units compared with other Plant Clinics and try to fix their weaknesses and better exploit their strengths. Findings provide a framework for the evaluation of Plant Clinics as providers of crop protection services. Apart from local significance for improving the operation of Plant Clinics in Guilan Province, findings reveal critical points of intervention for improving Plant Clinics performance in other developing countries where these units operate.

1. Introduction

Plant clinics are a meeting place where local extension officers, known as plant doctors, help farmers to deal with pests and diseases affecting their production (Boa, 2009; Bentley et al., 2009; Dooley and Chaudhary, 2012; Ghiasi et al., 2017). These units provide diagnoses and management advice for any problem and any crop. The concept of Plant Clinics evolved as scientists were trying to explore ways of providing support to farmers seeking advice on crop health problems (Srivastava, 2013). Thus, Plant Clinics are set up to offer general plant healthcare information and are open to everyone, typically once a week or fortnight (Boa, 2009). In Iran, a diagnosis laboratory of pests and plant diseases (Plant Clinics) is a unit founded by a natural person or a legal entity and is responsible for the diagnosis of crop pests and for recommending management tools with authorization granted by provincial committees (Ghiasi et al., 2017). The responsibilities of Plant Clinics in Iran include i) identifying crop pests and diseases and prescription of pest management practices, ii) examination in the laboratory for diagnosing harmful pests and plant pathogens, iii) field visits and inspection of pest problems, advisory and guidance of farmers for the management of pests and plant pathogens, iv) promotion of functions of crop protection networks and provision of support regarding natural enemies of pests and plant pathogens, and v) implementation of research, extension, and applied projects of plant protection in coordination with governmental authorities of the province. Since

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all responsibilities of crop protection networks are performed by Plant Clinics, activities mainly focus on visits to farms and gardens. Nonetheless, in case there is a need for further examination, the staff of Plant Clinics can perform it in the laboratory (Ghiasi et al., 2017). Eighteen laboratories for pest and plant disease diagnosis (Plant Clinics) have been established in Guilan Province since 2007 with some managerial activities for plant protection granted to them. Currently, there is one laboratory in each county and there are three laboratories in Rasht County, the capital of Guilan Province. The experts of Plant Clinics are in charge of visiting farms and gardens, giving technical recommendations and conducting projects with the Agricultural Organization. The Ministry of Agriculture (MoA) issues permission for Plant Clinics to work and monitors their function, but Plant Clinics in Iran are self-supporting units. Also, Plant Clinics can conduct projects with the MoA, getting some funding from the MoA. In some cases, farmers pay the cost of prescriptions and farm visits. In the initial years of operation, Plant Clinics have been gradually accepted to varying extent in different regions and continue to deliver services at different levels (Ghiasi et al., 2017).

Plant Clinics are a relatively new extension method in several developing countries (Danielsen and Matsiko, 2016). Many aspects of their operation and performance need to be better understood before they can become an integral part of extension services and contribute to system strengthening. It is not surprising that differences exist between different Plant Clinics programs, given the different regional socioeconomic conditions, traditions, and needs. As Plant Clinics are becoming more widespread, there is an increasing need to create basic procedures to regulate clinic operations (Danielsen and Kelly, 2010). Therefore, by providing insights into specific aspects of Plant Clinics service delivery, each system component may be useful in identifying intervention points and domains for strengthening the plant health system. However, monitoring and evaluation is hampered by the fact that performance indicators have not been quantified in most cases, which makes performance difficult to assess. Also, many indicators represent outputs rather than outcomes and no national targets have been set for individual countries.

Performance evaluation has always been of interest to managers. One main component to achieve usable efficiency is to evaluate the performance. Efficiency is an indicator that measures the capability of the management of a decision-making unit in optimum use of inputs for the production of outputs. The fact that in practice we face units that use diverse inputs and produce diverse outputs complicates the calculation of efficiency. Performance evaluation is used to recognize which units have good performance, which units do not have optimum performance, and in which factors the good or bad performance is rooted. Monitoring performance of agricultural extension is weak in many developing countries (Saravanan and Veerabhadraiah, 2003). Monitoring is often done haphazardly and mostly for accountability purposes, less so for learning and decision-making. Extension providers tend to regard monitoring as something done by 'others' for bosses and donors. Yet, the ability to self-monitor performance is a key element of institutional capacity (Simister and Smith, 2010). Plant Clinics performance in Uganda was, among other factors, influenced by basic operational and financial concerns, inter-institutional relations, and public sector policies (Danielsen and Matsiko, 2016). A comprehensive assessment of Plant Clinics access requires more information about the specific context, including feedback from different types of Plant Clinics users (e.g. in terms of gender, age, wealth and ethnic groups, level of education, etc.) (Danielsen and Matsiko, 2016). Quality criteria for Plant Clinics include technical quality, timeliness, staff attitude, feasibility of advice, clinic location, materials, organization and outreach (Danielsen and Kelly, 2010).

Data envelopment analysis (DEA) is a mathematical planning method for evaluating the efficiency of decision making units (DMU) which have multiple inputs and outputs (Fallah Molkesari et al., 2013). Efficiency estimation has always been of interest to researchers because of its importance in the evaluation of a firm's or organization's performance. Evaluating the productive efficiency of existing units is beneficial for identifying key factors affecting the performance and developing optimal operation strategies. Therefore, efficiency assessment is meaningful and essential for Plant Clinics evaluation, which can provide guidance for the installation of units and the repowering processes of the existing ones. DEA makes it possible to study factors affecting the performance of Plant Clinics in terms of inputs and outputs. The present study analyzed the performance of Plant Clinics by the DEA method. Given the importance of Plant Clinics on the one hand and the lack of studies on factors affecting their performance on the other hand, it seems necessary to evaluate the performance of Plant Clinics and to study factors affecting their efficiency and performance. Therefore, the present study undoubtedly can help enhance the performance of Plant Clinics.

2. Materials and methods

2.1. Sample selection

The statistical population consisted of farmers covered by the pests and plant diseases protection network plan (N = 10,197) and executives of Plant Clinics in Guilan Province, Iran (N = 18). Concerning Plant Clinics executives, all 18 individuals were included in the study, given the limited number of executives. Concerning farmers, we reached n = 119 respondents, considering a margin of error 3% and alpha 5%, according to Bartlett's table for the least sample size (Bartlett et al., 2001). This value corresponded to 6.6 farmers for each Plant Clinic, which was increased to 10 farmers, as we needed the satisfaction score as an output for each Plant Clinic. Therefore, 185 questionnaires were distributed among farmers who used Plant Clinics, out of which 180 completed questionnaires were used in the analysis. Five questionnaires were not usable and were eliminated.

2.2. Data collection and analysis

The preliminary data were collected by a questionnaire and a schedule list which were the main research tools. The questionnaire was composed of two distinct sections designed after a comprehensive review of the literature and relevant questionnaires (Saravanan et al., 2009; Ghiasi et al., 2017). The first section was about respondents' demographic information as well as general familiarity with Plant Clinics. The second section was about farmers' satisfaction with the services of Plant Clinics, which was considered as an output in the DEA model. This section was composed of four subsections: i) relevance of Plant Clinics services, which included four items, ii) quality of Plant Clinics services, which included six items, iii) usefulness of Plant Clinics services, which included six items, and iv) customers' services, which included eight items. In total, 24 items were included in this section, which were scored on a five-point Likert type scale (from 1 = very low to 5 = very high) by farmers who had used the Plant Clinics services. The scores given to those constructs were summed up and then the respondents were categorized according to the average distance from the standard deviation, as described by Allahyari et al. (2016):

A = low, when A < Mean - SD