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Service Quality and Its Impact on the Farmer Productivity in the Other Export Crop Sector: A Case Study of Ukuwela Agrarian Service Division

**A.H.M.S.W.B. Abeyrathne, Sarath S. Kodithuwakku and
L.H.P. Gunaratne***

ABSTRACT

The Other Export Crops sector of Sri Lanka has been growing over the past few years. The objective of this study was to identify and analyze the interfaces of the supply chain of services provided to the other export crop industry in order to find out the effects of service quality on farmer productivity. The study was conducted in the Ukuwela Agrarian Service Division.

Service quality was measured based on the Serve-qual model. Data was collected through both primary and secondary sources. Primary data was collected through in-depth interviews, structured questionnaires and stakeholder analysis of both service providers and recipients. Interfaces of the supply chain were defined based on the gap between the actual and anticipated service quality levels and experienced service quality level.

Nine interfaces were defined. As far as the overall service quality is concerned, five interfaces were moderately satisfactory, two were average and another two problematic. None of the interfaces were highly satisfactory. However a positive relationship was not found between the service quality gap and the farmer productivity, whereas experienced level of service was positively related with farmer productivity.

* The authors are, respectively, Final Year Undergraduate Student at the time the study was conducted, and Senior Lecturers in Agricultural Economics, University of Peradeniya.

Introduction

Other Export Crops are divided into three main categories, namely spices, beverages and other agricultural products. Cinnamon, pepper, cloves, cardamom, nutmeg and mace are the main spices cultivated in Sri Lanka, while beverages include coffee and cocoa. The cultivation of other export crops has increased considerably over the years. Export earnings from this sector in 2000 grew by 1.6% in Rupee terms to Rs 11,784 million, despite the decline in export volumes except for pepper, nutmeg, mace and essential oils (Central Bank of Sri Lanka, 2000). Pepper production improved during the past few years by 15% to 10,676 metric tons in 2000. However, export earnings from coffee and cloves declined by 92% and 26% respectively in 2000 due to a drop in export volumes. Earnings from cloves also declined in 2000 due to the drop in export volumes. (Central Bank of Sri Lanka, 2000).

The main objectives of this study are to assess the quality of services delivered by various service organizations to the producers and to draw relationships between productivity and service quality. This is to be achieved first, by identifying the supply chain of services, and then by analyzing the various interfaces of the supply chain in relation to the

quality of services (as perceived by the producers). In pursuing these objectives, it was hypothesized that the quality of services influences the productivity of Other Export Crops. As will be discussed later, the servequal model is used to assess the service quality and a subsequent regression analysis will enable the researchers to draw relationships between the service quality and the productivity. This study was carried out in the Ukuwela Agrarian Service Division of the Matale District.

Theoretical Context

Supply chain, according to Gattorna and Walters (1996), can be defined as a loop, which commences with the customer and ends with the customer, i.e. all materials flow through the loop and finished goods, including all information, and even all transactions. According to the same authors, the business should be looked as a continuous process. The objective of the supply chain concept is to achieve a balance of (a) high customer service, (b) low inventory investment and (c) low operating costs. Gattorna and Walters (1996) further argue that this can be achieved though the synchronization of the service requirement of the customer with the flow of materials from suppliers.

Service can be defined as a performance that one party offers to another that is essentially intangible and does not result in ownership (Kotler, 1999). Boone (1981) states that the services are varied and complex. The key features of the services are (a) intangibility, (b) perishability and (c) difficulties of standardization.

Zeithamal et al, (1990), have introduced a model for assessing service quality, which claims that the

customer evaluates the quality of a service experience as the outcome of the difference (gap) between expected and perceived service. This model is known as the gap model or the servequal model. The servequal model highlights the main quality requirements of delivered services. Five service quality dimensions suggested by Zeithamal et al, (1990) are (a) reliability¹, (b) responsiveness², (c) assurance³, (d) empathy⁴ and (e) tangibility⁵. (See figure 01).

¹ As long as the service recipient can depend on the service delivering organization for a particular service and the service delivering organization delivers an accurate service, the reliability of the service will be assured and then the quality of the service will be rated high.

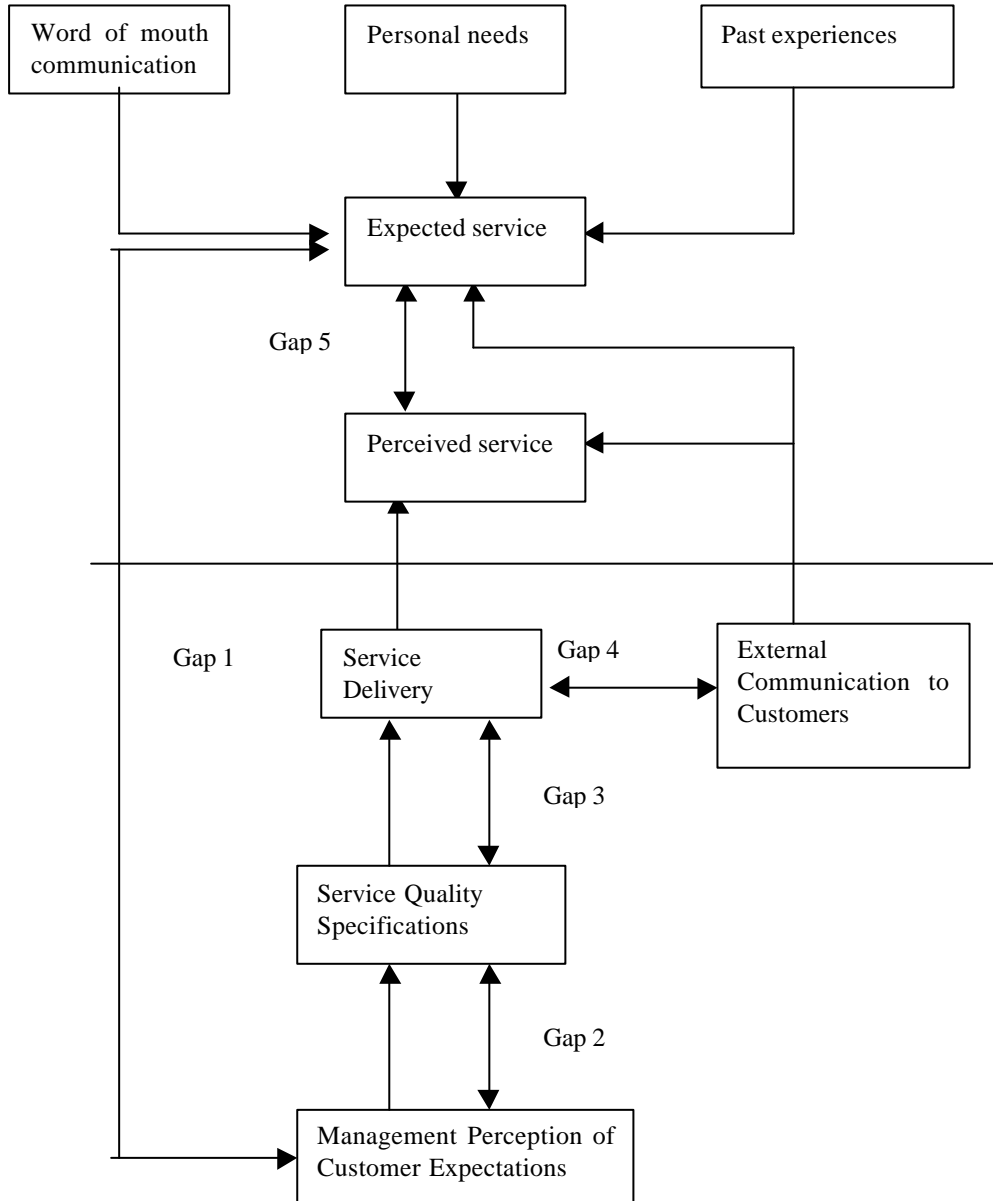
² When the service delivering organization is willing to help customers and it is providing a prompt service, the responsiveness will be rated high so that the service quality will also be rated high.

³ As long as the service delivering organizations are knowledgeable about what they supply, they are courteous to their customers and they are capable of winning the trust and confidence of the customers, the assurance of the service will be rated high.

⁴ Individual attention is the key feature in empathy, which often determines the service quality.

⁵ As long as the service delivering organization uses a fair amount of physical facilities, necessary equipment, appropriate communication materials and very good personnel, the tangibility of the service is automatically assured.

Figure 1: Conceptual model of service quality (Zeithaml et al., 1990)



- Gap 1: The gap between customer expectation and management perception.
 Gap2: The gap between management perception and service quality specification.
 Gap 3: The gap between service quality specification and service delivery.
 Gap 4: The gap between service delivery and external communication.
 Gap 5: The gap between perceived service and expected service. Gap 5 is caused by the other four gaps.

* Significant at 5 per cent probability level

Methodology

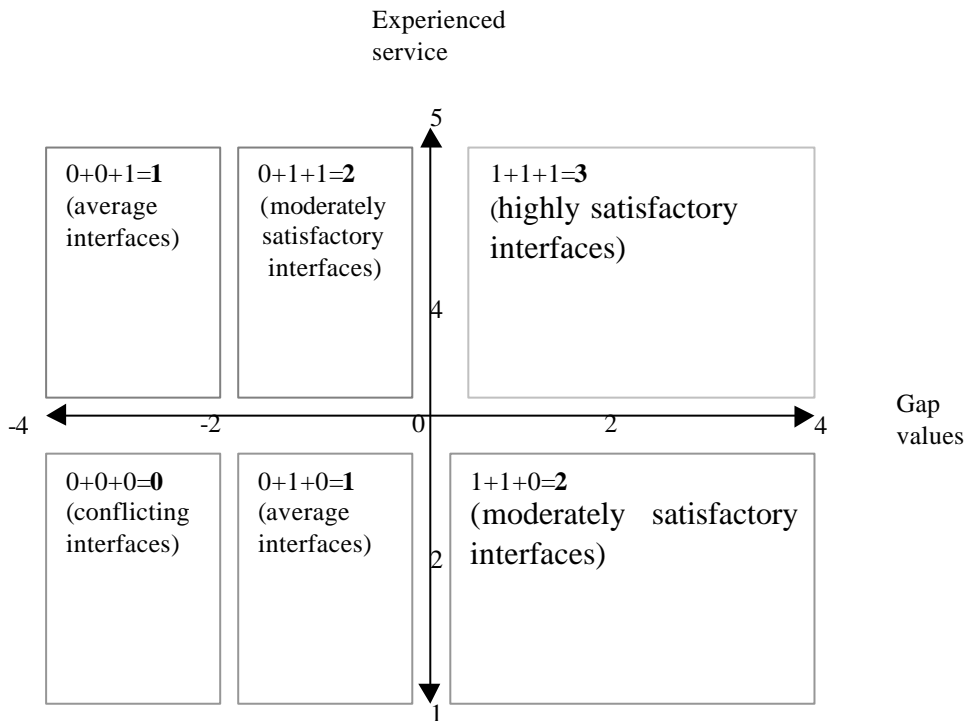
The study was conducted in the Ukuwella Agrarian Service Division in Matale district. Grama Niladhari (GN) divisions, Ulpahapitiya, Dubukola, and Guralawella were randomly selected for the purpose of the study. Cluster sampling technique was adopted in data collection on pepper monocropping and cocoa cultivation, whereas random sampling technique was adopted in data collection on Other Export Crop cultivators. Data was collected from both primary and secondary sources.

Primary data was collected using structured questionnaires, in-depth interview and stakeholder analysis, from both the service recipients and the service providers. A specific questionnaire was utilized to identify different service delivering organizations. In-depth interviews were carried out to identify the stakeholders of the industry and finally to construct the supply chain.

The next step was to collect the data on service quality from service recipients by using a specific questionnaire. Both the anticipated level of service and actual level of service were collected into a likert scale of 1 to 5. Service quality was defined based on servequal model. Data related to productivity aspects were collected using a separate questionnaire.

Service interactions are defined based on three criteria, viz. magnitude and the sign of the gap value and level of experienced service (see Figure 2). The gap value is interpreted as the difference between level of service received and anticipated level of service, which ranges from -4 to +4. The magnitudes of the gap values are specified as small gap values (-2 to 0 and +2 to 0) and large gap values (-2 to -4 and 2 to 4). A large positive gap value implies that the service provider delivers services beyond the expectations of the customer whereas a small positive gap value

Figure 2: Service interfaces defined based on gap values and level of experience



indicates that the service provider meets only the level of customer expectations. A large negative gap value indicates that the service firm is not meeting the customer expectations at all, whereas small negative gap values indicate that the service firm is not meeting customer expectations in several aspects. Scores were allocated as follows.

Criteria	Score
Meeting of customer Expectations (0 to 4)	1
Low dissatisfaction or no dissatisfaction (-2 to 0 or 0 to 4)	1

It should be noted that the positive and negative gap values indicated above could be found both in the regions of above and below

average experience levels in the 1-5 likert scale. Therefore, to be realistic, the level of experienced service either above or below average was also taken into account in defining the interfaces. Scores for defining interfaces were allocated as:

Criteria	Score
▪ If customer experiences above average level of service (>3)	1

Interfaces were defined based on the aggregate scores, viz. highly satisfactory (3 points), moderately satisfactory (2 points), average (1 point), problematic (0 point).

Eighteen interfaces were identified and nine of them were defined based on the criteria indicated above, as the degrees of interactions are the highest on those nine interfaces. Six of them were regressed against farmer productivity. Selection of these six interfaces is mainly based on sample size. The service quality was included in the regression analysis as two separate variables, viz. service quality gap and the experienced quality level. The regression function was specified as follows:

$$Y = (X_1, X_2, X_3, X_4, X_5, X_6)$$

Where

Y = Farmer productivity (Kg/Ac)

X_1 = Service quality gap : within the range of -4 to +4

X_2 = Land extent : Acres

X_3 = Home garden : Included as a dummy variable (If it is cultivated as a home garden = 1; If it is not cultivated as a home garden = 0)

X_4 and X_5 = Farmer income level were categorized into three groups viz. high, middle and low. These three income categories were included in the regression as dummy variables.

X_4 = High income = 1
Otherwise = 0

X_5 = Middle income = 1
Otherwise = 0

Where the low-income level was kept as the reference level

X_6 = Above average experienced level of service: Included as dummy variables viz. above average experienced level service = 1 and below average experienced level service = 0

Separate regressions were estimated for each of the interfaces. The appropriate models were chosen based on R^2 and Durbin Watson statistic.

Results and Discussion

Eighteen interfaces were identified and nine of them were defined based on service quality, as the degrees of interactions are the highest on these. As has been depicted in Figure 3, it can be observed that none of the interfaces were highly satisfactory. However five interfaces were moderately satisfactory, while two were average and another two were problematic.

Table 1 depicts the results related to the regression analysis. The detailed results are given in the appendix.

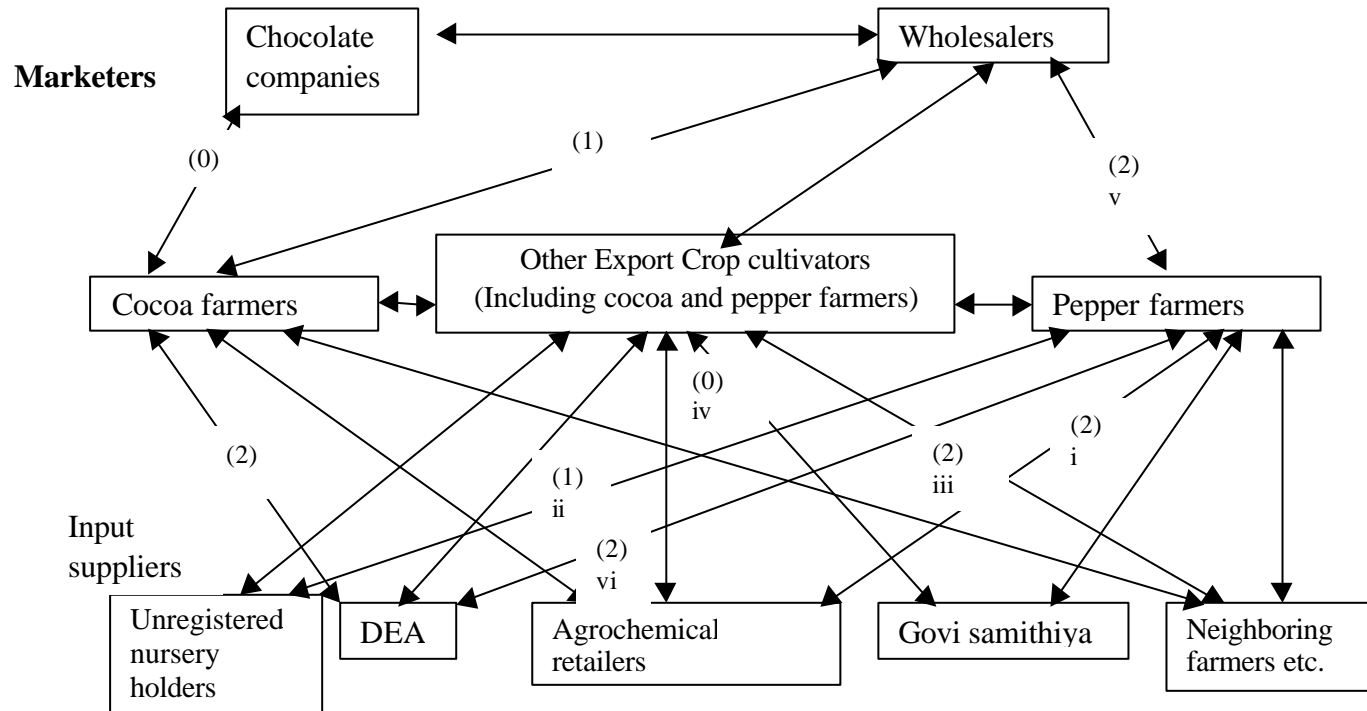
As shown in Table 1, almost all the models selected gave a satisfactory fit with the adjusted R^2 values ranging from 0.53 to 0.71. Moreover the estimated regression coefficients for above average experience level of services are positively related with farmer productivity in four interfaces viz. i,ii,iii and iv.

As far as the interface no. i (i.e. pepper farmer-agrochemical retailer) is concerned, increasing the experienced service quality from below to above average experience levels were found to be increasing farmer productivity. As the findings reveal, this could be achieved by increasing the reliability (i.e. in terms of giving the right information etc.) of the services provided by agrochemical retailers.

In interface no. ii (i.e. pepper farmer- unregistered nurseries), findings reveal that the farmer productivity can be increased by increasing the reliability, responsiveness and tangibility of the services. One of the major problems found in this interface in relation to the reliability was nursery operators' inability to meet the demand of the farmers in terms of required quantities and delivery deadlines. One of the major complaints made by farmers in relation to responsiveness was nursery operators' lack of customer care. Findings reveal that the tangibility of this interface could be improved by improving the communication and providing transportation facilities etc.

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Figure 3: Supply chain of Other Export Crop industry in Ukuwela Agrarian Service Division.



Note: The interfaces are indicated in roman numerals. The scores received are given within parentheses.

Table 1: Regression coefficients of above average experienced level of services for different interfaces

Interface	Model with the best fit.	R ²	Estimated coefficients of experienced level of services	Standard error	P value
1. Pepper farmers - Agrochemical retailers	log-log model	0.61	0.62	0.2469	0.02***
2. Pepper farmer – Unregistered nurseries	log-log model	0.65	1.10	0.2379	0.00**
3. Other Export Crops cultivators– Neighboring farmers	log-log model	0.55	0.55	0.3051	0.08**
4. Other Export Crop cultivators – Govi Samithiya	lin-log model	0.71	70.40	31.02	0.03**
5. Pepper farmer – Wholesaler	log-log model	0.56	-0.22	0.2762	0.94
6. Pepper farmer – Department of Export Agriculture (DEA)	log-log model	0.53	0.44	0.3153	0.17

As far as the interface no.iii (i.e. Other Export Crops cultivators - neighboring farmers etc.) is concerned, by increasing experienced service from below average to above average, farmer productivity is expected to be increased. This could be achieved by increasing the reliability and responsiveness of the exchange relationships. One of the major problems found in this interface in relation to reliability and responsiveness was that of low cohesiveness among farmer groups.

This could be overcome by strengthening the farmer organizations through capacity building.

In the interface no. iv (i.e. Other Export Crop cultivators – Govi samithiya), findings reveal that productivity could be further improved through increasing the responsiveness and assurance of the exchange relationships. One of the major problems found in relation to assurance was the low trust kept on

*** Ten per cent significant level.

Govi samithiya by the farmers. This was mainly due to politicization of this organization. Poor public relations coupled with lack of customer care by the official of this organization were the main problems related to the service quality aspect of the responsiveness.

Experienced services of interface no. v (i.e. pepper farmer – wholesaler) and interface no. vi (i.e. pepper farmer-Department of Export Agriculture) are not significantly related with farmer productivity. However, the findings reveal that there is a large disparity among farm gate prices received by different farmer groups for a given crop. Though the farmers are price takers, some of them are found to be benefiting from long term relationships established with wholesalers. It was interesting to find that some ethnic groups are getting favorable prices from the wholesalers of the same ethnic group. More than 80% of farmers interviewed were of the opinion that government involvement is a must in relation to marketing of these crops. Fifty per cent (50%) of the stakeholders also stated that government involvement in the marketing is necessary for the betterment of the farmers.

As far as interface vi (i.e. pepper farmer-DEA) is concerned, it was interesting to find out that there is no

significant relationship between this interface and farmer productivity. This is mainly because of the poor rating of the service provided by the Department of Export Agriculture by the farmers. Farmers receive subsidies from the DEA up to the harvesting season. The absence of DEA involvement during harvesting and marketing was found to be a major problem in relation to the reliability of the services provided. (as this is a critical stage in relation to post harvest losses and quality control etc.). Findings also reveal that the tangibility of the service could be further improved through improved communication.

Conclusions

The aim of this study was to identify and analyze different interfaces of the supply chain of services in relation to Other Export Crop sector in the Ukuwela Agrarian Service Division of the Matale district and to derive the relationship between service quality and productivity.

Eighteen service interfaces were identified along the supply chain of the Other Export Crop industry. Nine of them were defined based on service quality gap values and experienced service levels by the recipients, as the degrees of interactions are the highest on those

nine service interfaces. Findings reveal that non of the interfaces were highly satisfactory in terms of the level of service quality, as perceived by the farmers. However, there were five moderately satisfactory interfaces and two average interfaces. The number of problematic interfaces were two and those were the interfaces between the farmer and farmer organizations and the farmer and chocolate producing companies.

Both the experienced service level and the service quality gap were regressed with the productivity data and it was revealed that only the experience service quality level has a significant relationship with productivity. The service quality gap value did not show a significant relationship with productivity. This could be due to the farmers' high expectations of service quality. Of the six interfaces regressed (in relation to the experienced service level), only four interfaces (two moderate, one average and one problematic) were positively related with farmer productivity viz. i,ii,iii and iv (See Figure 3). This implies that the productivity could be further improved by increasing the quality

levels of the services delivered. However, it should be noted that the interfaces between the farmers and the Department of Export Agriculture and the farmers and wholesalers were not significant in increasing productivity. This is a very interesting phenomenon as the degree of farmers' interaction is the highest in these two interfaces, compared to other interfaces identified.

In the case of moderately satisfactory interface between farmers and agrochemical retailers, it was revealed that the reliability aspect of the service is poor mainly due to inadequate and inappropriate information provided by the retailers. This led to various degrees of inefficiencies in input usage. This has a policy implication for strengthening the relationship between the farmers and the Department of Export Agriculture. However, it should be noted that the relationship between the farmer and the agrochemical retailers is stronger (compared to that between the farmer and the Department of Export Agriculture). This is mainly due to (a) the open nature of the interaction¹ between the farmer and

¹ i.e. Payment for the services are made by the farmers themselves whereas in the case of the Department of Export Agriculture, payments for the services are not made by the service recipients.

the agrochemical retailer and (b) the package of services delivered by retailers including credit facilities.

As far as the moderately successful interface between Other Export Crops cultivators and neighboring farmers etc. is concerned, the necessity for strengthening the informal farmer groups through capacity building was revealed. This is to overcome the low cohesiveness among them and ultimately to improve the reliability and responsiveness of the exchange relationships, by which the increased productivity could be achieved. In the case of the problematic interface between Other Export Crop cultivators – Govi samithiya, findings reveal that productivity could be further improved through enhancing the responsiveness of the exchange relationships. This could be achieved through effective public relations. This may further increase the assurance of the exchange relationships by way of improving the level of trust and confidence reposed by farmers on the Govi samithiya. All in all, these findings clearly indicate that productivity could be enhanced through improved cohesiveness among farmers.

In the case of “average satisfactory” interface between farmers and unregistered nurseries,

findings reveal that the service quality aspects of reliability, responsiveness and tangibility are poor. This was mainly due to the nursery operators’ inability to meet the farmers’ demand for planting materials in terms of required quantities and delivery deadlines. Lack of customer care, poor communication and poor transportation facilities were among other major problems.

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Appendix

Interface: Pepper farmers - Agrochemical retailers

$$Y=0.41X_2+0.78X_3+0.84X_4+0.85X_5+0.62X_6+2.76$$

Out of the different models attempted, the log-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in Table 01.

Table 01

Independent variable	Estimated coefficients	P-values	Standard error
Service quality gap (X1)	0.15	0.42	0.1806
Land extent cultivated (X2)	0.41	0.00***	0.1231
Home garden (X3)	0.78	0.02**	0.3128
High income (X4)	0.84	0.06**	0.4407
Middle income (X5)	0.85	0.01**	0.2939
Above average actual service (X6)	0.62	0.02**	0.2469
Constant	2.76	0.00**	0.2788
\bar{R}^2	Durbin Watson	n	
0.61	1.83*	45	

Interface: Pepper farmer - Unregistered nurseries

$$Y=0.35X_2+0.52X_4+1.10X_5+2.72$$

The above specified model was estimated using software 'Shazam'. Out of the different models attempted, the log-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in table 02.

Table 02

Variable name	Estimated coefficients	P values	Standard error
Service quality gap (X1)	0.15	0.47	0.2128
Land extent (X2)	0.35	0.01**	0.1339
Home garden (X3)	0.50	0.14	0.3248
Middle income (X4)	0.52	0.04**	0.2495
Above average actual (experience) level service (X5)	1.10	0.00**	0.2379
Constant	2.72	0.00**	0.2556
\bar{R}^2	Durbin Watson	n	
0.65	1.93*	34	

** 10 per cent significant level

* 5 per cent significant level

Interface - Other Export Crops cultivators - Neighboring farmers etc.

$$Y=0.34X_2+1.02X_3+1.30X_4+0.54X_5+0.55X_6+2.54$$

The above specified model was estimated using software 'Shazam'. Out of the different models attempted, the log-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in table 03.

Table 03

Variable name	Estimated coefficients	P values	Standard error
Service quality gap (X1)	-0.35	0.89	0.2499
Land extent (X2)	0.34	0.03**	0.1478
Home garden (X3)	1.02	0.00**	0.3268
High income (X4)	1.30	1.01**	0.4830
Middle income (X5)	0.54	0.06**	0.2750
Above average experienced level of service (X6)	0.55	0.08**	0.3051
Constant	2.54	0.00**	0.2584
\bar{R}^2	Durbin Watson	n	
0.55	1.49*	51	

Interface: Other Export Crop cultivators – Govi Samithiya

$$Y=21.35X_2+68.17X_3+189.17X_4+44.72X_5+70.40$$

The above specified model was estimated using software 'Shazam'. Out of the different models attempted, the lin-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in table 04.

Table 04

Variable name	Estimated coefficients	P values	Standard error
Service quality gap (X1)	-5.51	0.63	11.25
Land extent (X2)	21.35	0.01**	8.245
Home garden (X3)	68.17	0.00**	17.92
High income (X4)	189.17	0.00**	34.69
Middle income (X5)	44.72	0.01**	15.47
Above average actual level of service (X6)	70.40	0.03**	31.02
\bar{R}^2	Durbin Watson	n	
0.71	1.83*	52	

Interface: Pepper farmer – Wholesaler

$$Y=0.50X_2+1.18X_3+1.07X_4+0.84X_5+2.50$$

The above specified model was estimated using software ‘Shazam’. Out of the different models attempted, the log-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in table 05.

Table 05

Variable name	Estimated coefficients	P values	Standard error
Service quality gap (X1)	0.35	0.84	0.1693
Land extent (X2)	0.50	0.00**	0.9910
Home garden (X3)	1.18	0.00**	0.2282
High income (X4)	1.07	0.03**	0.4867
Middle income (X5)	0.84	0.00**	0.2085
Above average actual level of service (X6)	-0.22	0.94	0.2762
Constant	2.50	0.00**	0.3239
\bar{R}^2	Durbin Watson	n	
0.56	1.80*	89	

Interface: Pepper farmer - DEA

$$Y=0.52X_2+1.17X_3+0.71X_4+0.68X_5+2.03$$

The above specified model was estimated using software ‘Shazam’. Out of the different models attempted, the log-log model was found to have the best fit. There is no autocorrelation among independent variables. The estimates of the model are given in table 06.

Table 06

Variable name	Estimated coefficients	P values	Standard error
Service quality gap (X1)	-0.14	0.35	0.1490
Land extent (X2)	0.52	0.00**	0.1136
Home garden (X3)	1.17	0.00**	0.2528
High income (X4)	0.71	0.08**	0.4046
Middle income (X5)	0.68	0.00**	0.2225
Above average actual level of service (X6)	0.44	0.17	0.3153
Constant	2.03	0.00**	0.4128
\bar{R}^2	Durbin Watson	n	
0.53	1.94*	101	