doi: 10.5191/jiaee.2017.24303

The Impact of Farm Visits on Farmers' Satisfaction with Extension: Examining the Dependence on Individual Methods in the Caribbean

Wayne G. Ganpat
The University of the West Indies, St. Augustine,

Lendel K. Narine
Amy Harder
University of Florida

Abstract

This research sought to investigate the dependence on farm visits in selected Caribbean islands, and estimate the impact of such visits on farmers' satisfaction with extension. The study utilized a causal-comparative design using a convenience sample from six major farming countries in the Eastern Caribbean. Descriptive frequencies, ANOVA, principal factor analysis, and hierarchical OLS regression models were presented. It appears the low use of alternate approaches to disseminate information to eastern Caribbean farmers has led to a dependency on farm visits. This is unsustainable primarily because of its high cost, given the financial constraints of countries. Results indicated that while farmers were fairly satisfied with extension, there was a significant difference in satisfaction based on country of residence, and frequency of farm visits was a significant moderator of satisfaction. Countries' GDP per capita were consistent with satisfaction levels. Proactive initiatives by extension that focus on alternative education approaches are needed; farmers can be clustered into commodity groups and extension can also make use of the good ICT infrastructure in these countries. Extension can influence farmers' expectations if it capitalizes on other approaches such as ICTs and group visits. Effective use of alternative lower-cost approaches can result in greater ability to deliver each dimension of quality and match farmers' expectations. Farm visits have become entrenched as the preferred extension method in the Caribbean. This first-time study, which looks at the issue from an extension and economic perspective, shows the urgent need to revisit the farm visit approach to extension.

Keywords: Caribbean, farm visits, farmer satisfaction, extension, dependence.

Introduction

In most Caribbean islands, extension services are provided mainly by the public sector. Within this sector, a commodity-based service exists for major traditional export crops. The removal of preferential agreements with the European Union resulted in a significant decline in agricultural income for small islands. However, the eastern Caribbean is still heavily dependent on agriculture for employment and to provide basic food commodities for domestic consumption (Ganpat & Webster, 2011). Furthermore, contractions in regional agriculture have led to a decline of extension services in some countries (Singh et al., 2005).

Agriculture in the Caribbean: Economic differences

In Grenada, food imports account for more than 25% of the nation's total import bill (International Fund for Agricultural Development, 2010). In St. Lucia, agriculture contribution to Gross Domestic Product (GDP) has consistently declined; from 13.7% in 1993 to 3% in 2015 (World Bank, 2016). Agriculture is the leading contributor to GDP in Dominica however, its contribution has declined mainly due to low productivity in the banana industry. Banana production declined by 63% and its export value decreased by 62% (Campbell, 2001). In St. Vincent, the situation is similar to that of St. Lucia and Dominica. Banana was the primary export crop and a major contributor to domestic GDP and employment. In comparison, Antigua's economy is driven by tourism and finance while agriculture accounts for only 2% of GDP (World Bank, 2016). Although the agricultural sector is one of the largest employers in Antigua, it is constrained by high labor costs, small size of local market, and competition from imported foodstuff.

In contrast, Trinidad and Tobago is the global leader of ammonia exports, the largest supplier of Liquefied Natural Gas to the United States of America, and the second largest exporter of methanol globally (Clarke, 2011). Pemberton (2006) stated the agricultural sector in Trinidad and Tobago has either declined or stagnated. Imports have substantially exceeded exports. Furthermore, Pemberton (2006) stated the agriculture labor force has decreased constantly since 1980. The shortage of labor has been blamed for continued low productivity of the sector; agriculture contributes only 0.25% of national GDP (National Training Agency, 2011).

Commonalities of all islands are evident in their declining agricultural sectors, competition from imports due to removal of preferential trading agreements, and labor shortages. Notably, the agricultural sector is the major source of employment in the Organization of Eastern Caribbean States (OECS) (Grenada, St. Lucia, St. Vincent, Antigua and Dominica). Agriculture accounts for a large portion of the workforce despite a low contribution to GDP in all islands (World Bank, 2016).

The low growth rate of Caribbean agriculture has resulted in a sectoral shift to the service industry (Kida, 2005). The International Monetary Fund (2013) noted Caribbean states are faced with high debt, and any governmental attempt to expand agricultural budgets must be justified based on the sector's performance determined mainly by its contribution to GDP. As shown, agricultural contribution to GDP is declining and therefore it is expected that public extension services in the eastern Caribbean islands will experience shrinking agricultural budgets in the future.

Ganpat et al. (2015) stated governments struggle to provide extension services to farmers due to extension officers' and farmers' reliance on traditional

extension approaches. Individual farm visits remain the main method used to provide public extension services in the eastern Caribbean, although governments have increasingly supported the use of information communication technologies (ICTs) to disseminate agricultural information via cell phones and SMS texting. Strong, Ganpat, Harder, Irby, and Lindner (2014) noted, however, that Caribbean extension officers used ICTs mainly for personal benefits and professional productivity rather than educating clientele.

Theoretical and Conceptual Framework

Cultivating positive relationships with a critical mass of clientele is essential to building the capacity of smallholder farmers within the eastern Caribbean. For assessment of customer satisfaction, this study utilizes the contrast theory (Hovland, Harvey & Sherif, 1957). Satisfaction is conceptualized as a process of an individual's comparison between expectations of the extension service and the service's actual performance, originally referred to as the confirmation-disconfirmation process in Festinger's (1957) theory of dissonance. The contrast theory suggests if actual product performance does not meet the consumer's expectations about the product, then the negative contrast between product expectation and actual performance will cause the consumer to exaggerate the discrepancy (Yi, 1990). Hence, the contrast theory takes a post-usage evaluation of satisfaction (Cardozzo, 1965). For example, suppose a farmer expects one farm visit per month from an extension officer. If the extension officer visits the farmer once in four months due to organizational constraints, then a contrast exists between service performance and the farmer's expectations. The theory indicates the farmer will exaggerate the disparity, leading to amplified dissatisfaction with the extension service. Conversely, if the extension officer visits twice per month thereby exceeding expectations, then the contrast will lead to exaggerated levels of satisfaction. Consistent to the contrast theory, Suvedi, Lapinski, and Campo (2000) found frequent users of extension services are significantly more satisfied than less frequent users.

According to Wilson, Zeithaml, Bitner, and Gremler (2008), service quality has five dimensions: reliability, assurance, responsiveness, empathy, and tangibility. Wilson et al. (2008) noted reliability refers to an ability to consistently perform the service; assurance relates to the knowledge and expressed consideration of service provider; responsiveness is a willingness to promptly assist clients; empathy relates to provision of individualized attention, and; tangibles are the appearance of facilities, personnel, and communication materials. If the primary approach to extension is farm visits, then service quality relies on individual contact with extension. Therefore, this study operationalized satisfaction with extension using each dimension of service quality. However, farm visits are highly resource intensive (Ali-Olubandwa et al., 2011; Nisha, 2006). If financial constraints limit the delivery of extension services, then actual service performance will decline.

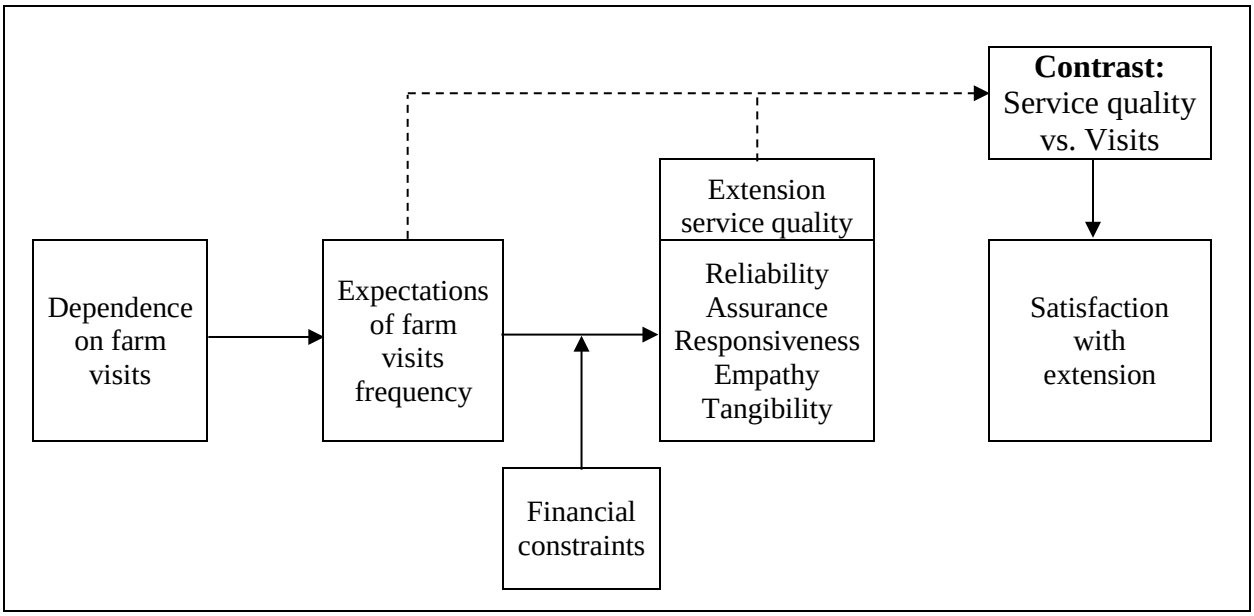

Figure 1. The hypothesized effects of a dependence on farm visits.

Guided by the contrast theory, this study conceptualizes a dependence on farm visits will increase farmers' expectations of extension services. The financial constraints of countries will hinder extension's ability to match service performance with farmers' expectations, and the contrast will result in greater levels of dissatisfaction with the extension service. This study hypothesizes Trinidad is better positioned to deliver the five dimensions of service quality based on its economic capacity relative to the OECS. As such, Trinidad farmers' expectations of extension service and extension's actual service performance are more likely to be aligned.

Purpose and Objectives

The purpose of this study is to determine the extent to which farmers are dependent on farm visits as their primary source of extension service. Specifically, this study: (a) assessed farmers' satisfaction with extension in six selected Caribbean countries, (b) determined differences in farmers' satisfaction with extension among countries, and, (c) estimated the impact of the frequency of extension visits on farmers' satisfaction with extension, given economic differences in countries. This study hypothesized the frequency of extension visits moderates the relationship of farmers' satisfaction with extension in the selected Caribbean countries.

The agricultural budget and allocations to the public extension service of Trinidad significantly exceed that of all other Caribbean islands (Government of the Republic of Trinidad and Tobago, 2015). Additionally, Trinidad farmers benefit from a pluralistic extension system therefore, farmers' dependence on the public service is expected to be less than that of other islands. Tobago was excluded from the study due to the small size of its extension staff. Because of the economic differences between Trinidad and other selected islands, a further objective of this study was to compare farmers' satisfaction with extension in Trinidad with farmers' satisfaction in other islands. The main working hypothesis was that farmers' satisfaction with extension in Trinidad was expected to be higher.

Methods

Sampling

The population for this study was all farmers of Trinidad, Antigua, Dominica, St. Lucia, St. Vincent, and Grenada. Trinidad is the largest in the group. However, identification of a sampling frame from an accessible list of farmers was not possible; there were no reliable statistical databases of farmers in any of the countries. Therefore, information on farming (estimated total number of farmers, farm sizes, farming locations and number of farmers in each farming village) was obtained directly from the extension division of each island. A non-probability sampling technique was used. Due to unknown sampling error, caution must be taken if the results of this study are to be generalized to the population. A total convenience sample (N = 717) comprised farmers from Antigua (n = 59), Dominica (n = 102), St. Lucia (n = 100), St. Vincent (n = 106), Grenada (n = 100) and Trinidad (n = 250). Farmers were surveyed with the use of a structured, closed-ended questionnaire via face-to-face interviews. These interviews were conducted by trained agriculture undergraduate students who were citizens of each of the countries sampled. Interviewers visited major agricultural communities in respective countries and interviewed farmers with their verbal consent. The instrument took approximately 20 minutes to complete.

Instrument

A panel of experts in the areas of agricultural extension, agricultural economics, and rural development examined the instrument for validity. A pilot of the instrument was done with five farmers from each country (n = 30) and the final instrument was modified with respect to item wording. The final questionnaire consisted of 32 Likert-type statements that operationally assessed farmers' satisfaction with extension services. Respondents were asked to indicate their agreement or disagreement to individual statements and each response was scored as follows: *Strongly Agree* = 4, *Agree* = 3, *Disagree* = 2, and *Strongly Disagree* = 1. Based on the Cronbach's alpha, the scale appeared to have good internal consistency (α = .97). Other information collected related to gender, age, education, farm size, number of farmed parcels of land, number of extension visits, farming status, type of production, preferred method of interacting with extension, access to other information sources, and participation in farmers' groups.

Analysis

Data were coded and analyzed with the use of SPSS. A descriptive summary of all items assessed was presented. Items were ranked using an inter-item weighted index to facilitate a good description of farmers' level of agreement with each statement of satisfaction with extension services. The most agreed upon statement was ranked first while the least agreed upon statement was ranked last. The Satisfaction Weighted index (SW) was calculated with a simple arithmetic formula: SW = SA (4) + A (3) + D (2) + SD (1). SW ranged from 100 (very low satisfaction) to 400 (very high satisfaction).

Principal Factor Analysis (PFA) was used to reduce the farmers' satisfaction scale into a concise construct. Only items with commonalities greater than 0.50 were then included in the farmers' satisfaction index calculation. From included items, a farmer satisfaction score was calculated as a horizontal sum of individual ordinal (or Likert) responses. Total satisfaction (TS_i) was derived with the following equation, where S is the ordered response to each item: $TS_i = \sum_{i=1}^{i} S_i$. The final index, "Farmers' Satisfaction with Extension" (FSE) was normalized to a range of 0 to 1, with a higher value indicating greater satisfaction with extension. Specifically,

values between 0 – 0.25 indicates strong dissatisfaction, 0.26 – 0.50 shows dissatisfaction, 0.51 – 0.75 is moderate satisfaction, and 0.76 – 1 represents high satisfaction.

Differences in farmers' satisfaction with extension services based on country of residence were determined with the use of an ANOVA model with a Tukey's b post-hoc test. The impact of extension visits on farmers' satisfaction with extension, given differences in countries, was estimated with the use of a Hierarchical regression model with two levels. The model was specified as follows:

$$FSE_i = \beta_0 + \beta_1 C_{i.....n} + \beta_2 V_i + \beta_3 C_{i.....n} V_{i.....n} \quad (1)$$

Where C is the country of residence and V is the frequency of visits (1 is frequent, 0 other). The moderating effect was represented by an interaction between individuals' country of residence and frequency of visits. In block 1, the main effect of frequency of visits, and country of residence on farmers' satisfaction (FSE) was determined. In block 2, the frequency of extension visits was included as a moderator (interaction term) in the relationship between country of residence and farmers' satisfaction with extension. In block 1 and 2 of this model, Trinidad was used as the reference category (0), such that each coefficient gives the average satisfaction with extension compared to satisfaction in Trinidad. Therefore, the coefficient for each interaction term showed average satisfaction for those who were visited frequently (1) and, lived in a particular island of the OECS, compared to the average satisfaction of Trinidad farmers.

Sample Characteristics

Table 1 provides a descriptive summary of farmers' demographic characteristics. Most farmers were males, had primary or no formal education, and operated full-time on small crop-based farms. The identified characteristics are supported in a report by Graham (2012) that outlined the profile of typical Caribbean farmer. With respect to extension presence, most farmers reported annual (36%) or monthly (31%) contact with extension officers, preferred face-to-face contact with officers, utilized other sources of farming information, and did not belong to a farmers' group. Nearly 20% of farmers reported no visits from officers.

Table 1
Demographic Frequencies

Variable	Levels	*n*	%
Country of residence	Antigua	59	8
	Dominica	102	14
	St Lucia	100	14
	St Vincent	106	15
	Grenada	100	14
	Trinidad	250	35
Gender	Male	529	74
	Female	188	26
Age	Younger (<50)	358	50
	Older (>50)	359	50
Education	Low (Primary/None)	390	54
	Average (Secondary)	237	33
	High (Certificate/Tertiary)	90	13
Farm Size (acres)	Marginal (<1)	93	13
	Small (1-5)	489	68
	Large (>5)	134	19
Farming status	Full time	538	75
	Part time	179	25
Type of production	Crop	668	93
	Livestock	49	7
Extension visits	Never	128	18
	Annually	259	36
	Monthly	221	31
	Fortnightly/Weekly	109	15
Preferred interaction with extension	Face to face	678	95
	Phone	39	5
Information sources other than extension	Yes	425	59
	No	292	41
Farmer group member	Yes	208	29
	No	509	71

Results and Discussion

Farmers' Satisfaction with Extension

Responses to items of the farmers' satisfaction construct were ranked from strongly agree to strongly disagree. The Satisfaction Weighted index (SW) had an observed range of 219 to 277. Most farmers agreed the extension service helps them without expecting anything in return (SW = 277). In all islands, extension is a public good and provided to farmers free of charge. Most farmers indicated that they like collaborating with the extension service (SW = 274). This suggests farmers are willing to work closely with extension officers. Working with extension allows for inclusion in training activities, quicker response to farm-related problems, and improves farmers' ability to provide feedback to extension. Also, many farmers noted they would recommend the extension service to other farmers (SW = 273). Notably, only a minority of farmers strongly agreed with each statement.

Index Construction: Principal Factor Analysis (PFA)

PFA was used to extract a single, concise measure of farmers' satisfaction with extension. Items with low commonalities were omitted with the criteria (1) for item exclusion being: *If commonality is less than 0.50, then omit from index.* Following this, another PFA was performed on items that met criteria 1 using an orthogonal rotation method (Varimax). The final items in Model 2 are presented in Table 2. With respect to model assumptions, PFA Model 2 satisfied both assumptions; the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test and the Bartlett's test of sphericity. An examination of the scree plot used to assess the Eigen values against equivalent factor indicated only one factor was necessary. This finding was corroborated by the high value of KMO and high significance of Bartlett's test of sphericity, i.e. all items were highly correlated such that only one factor was sufficient. Further, all items of the latent variable (farmers' satisfaction) explained over 60% of the variation in the original variable.

Table 2.
PFA Model 2 of Items meeting Criteria 1

Items	Commonalities		
	Init.^	Ext.#	F1*
In my time of need, the Extension service is always ready to assist me	0.695	0.578	0.760
I feel confident that when I have important decisions to make, I can count on the Extension service to support me	0.707	0.625	0.790
The Extension service/officer is generally concerned about my welfare and that of my family	0.597	0.555	0.745
I am confident that the organization will consult and take my views when plans that impact me are being considered	0.573	0.552	0.743
The Extension service is always ready and willing to work with me to solve my farm problems	0.674	0.645	0.803
I would willingly recommend other farmers to the Extension service	0.530	0.504	0.710
My expectations are held in high regard by the Extension service	0.622	0.596	0.772
I am pleased with the service offered and will continue to depend on the Extension service	0.728	0.705	0.839
The services provided to me is vital to my farming	0.636	0.609	0.780
Extension officers are open with me most of the time	0.672	0.633	0.796
Extension officers do their job to the best of their ability	0.682	0.637	0.798
Extension officers are easy to reach	0.645	0.62	0.788
Extension offers a high-quality service	0.670	0.646	0.804
The Extension officer operates in a professional manner	0.637	0.586	0.765
I have a good working relationship with extension officers	0.720	0.707	0.841
I enjoy dealing with the Extension service.	0.738	0.696	0.834
Extension can be relied on to keep its promises	0.621	0.580	0.762
Extension is known to be successful at the things it tries to do	0.557	0.529	0.727
I am very confident about the skills of extension staff	0.625	0.567	0.753
Extension officers value my opinion	0.579	0.511	0.715
Summary statistics			
Cumulative Variance (%)		60.403	
Kaiser-Meyer-Olkin measure of sampling adequacy		0.974	
Bartlett's test of Sphericity		11994.9**	

Note. $^{**}p < 0.01$. *F1 – Factor 1. ^Initial communalities. #Extraction communalities.

An overview of the extracted factor showed it covered several areas of farmers' satisfaction consistent with the five areas of service quality as described by Wilson et. al. (2008) Items presented in Table 2 ($n = 20$) were included in the FSE index (Farmers Satisfaction with Extension) based on the summary statistics, commonalities, and item loadings of PFA Model 2. The index is considered a valid and reliable representation of satisfaction towards extension services.

Satisfaction by Country and Economic Indicators

Table 3 provides the results of a univariate analysis of farmers' satisfaction with extension (FSE) based on country of residence. Results indicated farmers' satisfaction with extension was significantly different based on country of residence (F = 92.16**). Tukey's *b* post-hoc test revealed Trinidad farmers had the highest level of satisfaction while farmers of St. Vincent had the lowest level of satisfaction with extension. Further, St. Lucia, Dominica, and Grenada had significantly higher levels of satisfaction than Antigua.

A comparison of farmers' satisfaction to economic power (GDP) showed that despite agriculture contributing the least to GDP in Trinidad, farmers there reported the highest level of satisfaction with extension. Narine et al. (2015) noted Trinidad's economy outperformed all countries of Latin America and the Caribbean due to its abundant energy resources. Revenues from non-renewable resources are often used to inefficiently subsidize the agricultural sector, suggesting that Trinidad's public extension had greater financial resources to serve farmers. In contrast, St. Vincent, which had the lowest GDP per capita and a fairly high contribution from the agricultural sector experienced the lowest level of satisfaction with Extension. Even though agriculture was very important to the economy, extension may not be able to effectively serve farmers due to financial constraints (low GDP). Unlike Trinidad, St. Vincent relies mainly on agriculture and to a limited extent on tourism.

Table 3
ANOVA model showing differences in FSE among countries

Country	*n*	GDP/Capita Rank*	Agri/ GDP[#]	Satisfaction rank	Mean FSE (SD)^	*F*
St. Vincent	106	6	2	6	0.26 (0.02) [a]	92.16**
Antigua	59	2	5	5	0.33 (0.02) [b]	
St. Lucia	100	4	4	4	0.50 (0.02) [c]	
Dominica	102	5	1	3	0.53 (0.02) [c]	
Grenada	100	3	3	2	0.53 (0.02) [c]	
Trinidad	250	1	6	1	0.61 (0.01) [d]	

Note: **P<0.001. ^Notation for Tukey's *b* post-hoc: a ≠ b ≠ c ≠ d. *GDP per capita (World Bank, 2016) ranked from highest (1) to lowest (6). [#]Agriculture contribution to GDP, ranked from highest (1) to lowest (6). FSE: Farmers' satisfaction with Extension (range 0-1)

As shown in Table 3, except for St. Vincent and Antigua, Caribbean islands are moderately satisfied with extension services. Antigua also had low levels of satisfaction with extension however, agriculture contribution to Antigua's GDP was also low. While other islands are dominated by agricultural activities, Antigua's economy is based on a financial and tourism sector. However, Table 3 indicates Trinidad's GDP is higher than that of Antigua which suggests Trinidad is better positioned to support extension. In Dominica, where agriculture contribution to GDP is highest and GDP per capita is low ranked, farmers' satisfaction seems to be fair. Notably, very high satisfaction levels (FSE > 0.75) with extension did not exist in any of the countries.

Impact of Frequency of Visits on Satisfaction

A regression model was used to estimate the impact of frequency of extension visits on the relationship between farmers' satisfaction with extension and country of residence. Table 4 presents the results of a hierarchical regression model with two levels. In block 1, the main effect of frequency of visits and country of residence on farmers' satisfaction (FSE) was determined. In block 2, the frequency of extension visits was included as a moderator (interaction term) in the relationship between country of residence with "Trinidad" as the reference category, and farmers' satisfaction with extension. In block 1, the model was significant (F = 95.20**) and accounted for 44% of the variation in FSE. In block 2, the model was significant and different to block 1 (F change = 10.78**; F = 60.40**) while accounting for 48% of the variation in FSE.

In block 1, the main effects indicated farmers of all other countries were significantly less satisfied with extension than farmers in Trinidad ($\beta < 0$). With respect to the effect of the moderator (frequency of extension visits), results indicated when extension visits were frequent in all countries, satisfaction with extension significantly increased at a higher rate when compared to Trinidad. This finding suggests Trinidad farmers were less sensitive to changes in the number of extension visits received. Based on the signs of coefficients in Table 4, block 2, frequency of extension visits was a significant moderator because it affected the direction of the relationship between country of residence and satisfaction.

Table 4

The impact of country of residence on FSE moderated by frequency of farm visits.

Model	Variables	β	SE	*T*	VIF
1 Main effects	Constant	0.56	0.01	51.87**	
	Antigua	-0.27	0.02	-12.78**	1.14
	Dominica	-0.10	0.02	-5.67**	1.24
	St. Lucia	-0.11	0.02	-6.51**	1.21
	St. Vincent	-0.33	0.02	-19.05**	1.24
	Grenada	-0.09	0.02	-5.37**	1.21
	Frequent visits	0.09	0.01	8.21**	1.08
2 Interactions	Constant	0.60	0.01	47.89**	
	Antigua	-0.36	0.03	-13.19**	2.02
	Dominica	-0.13	0.03	-4.49**	3.81
	St. Lucia	-0.15	0.03	-5.94**	2.63
	St. Vincent	-0.41	0.02	-19.87**	1.88
	Grenada	-0.15	0.03	-5.89**	2.94
	Frequent visits	0.01	0.02	0.65	2.87
	Antigua*Frequent visits	0.20	0.04	4.80**	2.06
	Dominica*Frequent visits	0.07	0.04	2.03*	4.33
	St. Lucia*Frequent visits	0.07	0.03	2.12*	2.92
	St. Vincent*Frequent visits	0.23	0.04	6.32**	1.77
	Grenada*Frequent visits	0.12	0.03	3.37**	3.31
1	F (6, 716)		95.20**		
	Adjusted R^2		0.44		
2	F (11, 716)		60.40**		
	F-Change		10.78**		
	Adjusted R^2		0.48		

Note. Frequent visits = 1 if weekly/fortnightly/monthly, 0 other. Trinidad is the reference category for country.

The moderator had a positive net effect on the relationship between country of residence and satisfaction. The interaction between farm visits and country of residence on satisfaction indicated a clear pattern; if extension visits are frequent, then all countries are more satisfied with extension. Alternately, if farm visits decrease, then farmers' satisfaction with extension significantly decreases for the selected OECS countries. Results strongly suggest farmers' satisfaction is dependent on frequency of individual farm visits; a costly and currently unsustainable approach. Results also showed that farm visits did not have a major effect on farmers' satisfaction with extension in Trinidad; Trinidad farmers are less dependent on farm visits.

Conclusion, Implications and Recommendations

Given constraints outlined by Ganpat and de Freitas (2010), the extension service is assumed to operate beyond its financial and human capacity in most islands. Severe financial constraints and increased pressures to respond to a myriad of administrative, farming, and non-farming problems often result in low contact levels with clients on a timely basis. Farmers may experience dissatisfaction in extension's ability to respond to their farming needs if there is a

lack of other reliable sources of information or ineffective use of other techniques to disseminate critically needed information. Furthermore, many islands may not have sufficient resources to serve a diverse group of small-scale farmers via a high-cost approach such as individual farm visits. Therefore, while results indicated a generally moderate level of satisfaction with extension, a sustainable extension approach is needed to ensure future extension advisory support for farmers. Extension services are expected to operate with small budgets, given the low contribution of agriculture to GDP. In an era of declining budgets, in many developing countries extension's ability to continue to pursue a high cost approach will diminish in the future. Public extension must seek to explore ways of improving farmers' satisfaction while operating in a cost-effective manner; individual farm visits should be carefully evaluated against other approaches. According to Strong, Ganpat, Harder, Irby, and Lindner (2014), extension in the Caribbean already has the internal capacity to use alternative approaches in extension. Efforts should be placed on promoting different approaches while orienting farmers to the differences in service characteristics and benefits of such approaches.

This study showed while Caribbean farmers were somewhat satisfied with extension services, there were significant differences in satisfaction based on country of residence. Smaller islands of the Caribbean exhibited significant dependence on the traditional farm visit for their extension services. In all cases, satisfaction with extension significantly increased when farmers of small islands were visited more frequently by extension. Therefore, the frequency of visits impacted farmers' satisfaction with extension, depending on the country of residence. However, frequent visits had a relatively minor impact on Trinidad farmers' satisfaction with extension. These findings are consistent with the contrast theory. In Trinidad, the existence of a pluralistic extension system may account for the lack of dependence on the farm visit method. The National Agricultural Marketing and Development Corporation of Trinidad and Tobago utilizes an Agricultural Market Information System that serves as a virtual platform for agricultural marketing and price information. Also, several studies have noted Trinidad farmers rely on input suppliers as a major source of farming information and advice (Dolly, 2009; Dolly, 2005). Further, NGOs has been using the Farmer Field School (FFS) method to educate farmers on the use of Integrated Pest Management strategies (Dolly, 2009). Also, various Farmers' Associations of Trinidad provide extension services to farmers on a group basis. The availability of multiple sources of farming information and approaches to extension in Trinidad may account for the lower observed dependence on traditional farm visits by public extension services. Low GDP per capita in the struggling OECS economies infer that government budgets may not be able to effectively sustain the farm visit method in the long run, primarily because of the cost of using this method.

Current CARICOM policies promote ICT infrastructure in small islands (e.g. ICT4D initiative). As such, local governments should seek to actively encourage effective utilization of ICTs in public service; the extension service could be an area of focus because of the strong dependency on income from agriculture in the islands. According to Ganpat and de Freitas (2010) and Strong et al. (2014), extension officers of the OECS possessed the technical skills needed to utilize ICTs and there was relatively high access to ICTs.

However, ICT usage has been somewhat limited to personal benefits and rarely utilized in job related, educational or developmental contexts. ICTs have shown to be much more cost effective to deliver extension (MEAS, 2013; FAO, 2014; Harris, 2013).

Governmental bodies should seek to incorporate ICTs in meeting their individual agricultural development goals. In moving forward, it is recommended that OECS islands reduce their dependence on a financially unsustainable approach by initiating the use of other more efficient dissemination methods, for example, ICTs. Initial ICT training and educational activities for extension and farmers require significant levels of fixed investment. However, the associated long run costs of ICTs will likely be lower than costs experienced with the farm visit method presently utilized.

References

Anderson, R. J., Feder, G., & Ganguly, S. (2006). *The rise and fall of training and visit extension: An Asian mini-drama with an African epilogue.* World Bank Policy Research Working Paper 3928. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/8447/wps3928.pdf?sequence=1

Benor, D., & Harrison, J. Q. (1977). *Agricultural extension: The training and visit system.* Washington, D.C: World Bank.

Benor, D., & Baxter, M. (1984). *Training and visit extension*. Washington, D.C: World Bank.

Campbell, D. (2001). *Positioning Dominica's agriculture for sustained economic and social development.* Trinidad and Tobago: University of the West Indies.

CARICOM. (2004). *CARICOM Ministers adopt aggressive ICT strategy.* Communication Issued at the Conclusion of the Third Meeting of Ministers Responsible for Information and Communication Technology. Barbados: CARICOM.

Cardozo, R. (1965). An experimental study of customer effort, expectation, and satisfaction. *Journal of Marketing Research, 2*(8), 244-249.

Clarke, T. (2011, June). *The sustainability of Trinidad and Tobago's rate of economic growth: An assessment and application of green national accounting and genuine savings.* Paper presented at the 5th JIEP Biennial Conference on the Environment, Kingston, Jamaica.

Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education.* London: Routledge.

Costello, A. B., & Osborne, J. W. (2005). Exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research and Evaluation, 10*(7), 1-9.

Dolly, D. (2005, May). *Assessing the benefits of two farmer field schools recently conducted in Trinidad and Tobago*. Proceedings of the 21st Association of International Agricultural and Extension Education Conference, Texas.

Dolly, D. (2009). An assessment of the implementation and outcomes of recent farmer field schools to improve vegetable production in Trinidad and Tobago. *Journal of International Agricultural and Extension Education, 16*(2), 49-62. doi: 10.5191/jiaee.2009.16201

Eurostrategies. (2004). *Feasibility study on the future of the ICT regulatory and institutional framework and*

establishment and development of the information society in the Caribbean. Framework Contract 2000-2005.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press

Ganpat, W., & Webster, N. (2011, July). *Engaging youth in St Vincent and the Grenadines in agriculture: Their fears, expectations and food production interests.* Paper presented at the 29th West Indies Agricultural Economics Conference, Saint Vincent.

Ganpat, W., & de Freitas, C. (2010). Caribbean nations. In R. Saravanan (ed.), *ICTS for agricultural extension. Global experiments, innovations and experiences* (pp. 45-82). New Delhi: New India Publishing.

Ganpat, W., Webster, N., & Narine, L. K. (2014). Farmers' satisfaction with extension services in the Organization of Eastern Caribbean States. *Journal of International Agricultural and Extension Education, 21*(3), 49-62. doi:10.5191/jiaee.2014.21304

Ganpat, W., Ragbir, S., & de Freitas, C. (2010, July). *The use of information and communication technologies in the modernization of Caribbean agriculture: Focus on agricultural extension.* Paper presented at the 28th West Indies Agricultural Economics Conference, Bridgetown, Barbados.

Government of the Republic of Trinidad and Tobago. (2015). *Budget statement 2015.* Trinidad and Tobago: Central Bank.

Graham, B. (2012). *Profile of Small-scale Farming in the Caribbean*. Workshop on Small-scale Farming in the Caribbean. Antigua and Barbuda: FAO.

Hovland, C., Harvey, O., & Sherif, M. (1957). Assimilation and contrast effects in reaction to communication and attitude change. *Journal of Abnormal and Social Psychology, 55*(7), 244-252.

IFAD. (2010). *Grenada: Market access and rural enterprise development programme*. Retrieved from http://docplayer.net/8393614-The-international-fund-for-agricultural-development-grenada-market-access-and-rural-enterprise-development-programme-programme-final-design-report.html

International Institute for Communication for Development (IICD). (2006). *ICTs for agricultural livelihoods impact and lessons learned from IICD supported activities*. Netherlands: IICD.

Musa, Y. N., Aboki, E., & Audu, I. (2013). The Limitations and implications of training and visit (T&V) extension system in Nigeria. *Journal of Agriculture and Sustainability, 4*(1), 67-76.

Narine, L. K., Boman, M., Ali, A. D., & Moonsammy, S. (2015, June). *Productivity in reproducible and non-renewable capital stock in an energy dependent economy: Sustainability in Trinidad & Tobago.* Paper presented at the 21st Annual European Association of Environmental and Resource Economists Conference, Helsinki, Finland.

National Training Agency (NTA). (2011). *Energy, agriculture and manufacturing LMI reports*. Trinidad: The Research and Development Department.

Pemberton, C. (2006, October). *Agricultural development and employment in the Caribbean: Challenges for the future.* Paper presented at the 2006 Tripartite Caribbean Employment Forum, Barbados.

Private Sector Commission. (2007). *Jagdeo Initiative: Strengthening agriculture for sustainable development.* Guyana: Technical Information Bulletin No. 8.

Purcell, D. L., & Anderson, J. R. (1997). *Agricultural extension and research: Achievements and problems in national systems.* Washington, D.C: World Bank

Renwick, S. (2010, August). *Current trends in agricultural information services for farmers in Trinidad and Tobago/Caribbean*. Paper presented at the 76th IFLA General Conference and Assembly, Gothenburg, Sweden.

Singh, R. H., Rankine, L. B., & Seepersad, G. (2005). *The CARICOM regional transformation programme for agriculture*. A review of agricultural policies: Case study of St. Lucia. Report prepared for the CARICOM secretariat.

Strong, R., Ganpat, W., Harder, A., Irby, T. L., & Lindner, J. R. (2014). Exploring the use of information communication technologies by selected Caribbean extension officers. *Journal of Agricultural Education and Extension, 20*(5), 485-495. doi:10.1080/1389224X.2014.927373

Suvedi, M., Lapinski, M. K., & Campo, S. (2000). Farmers' perspectives of Michigan State University extension: Trends and lessons from 1996 and 1999. *Journal of Extension, 38*(1). Retrieved from https://www.joe.org/joe/2000february/a4.php

Wilson A., Zeithaml V. A., Bitner M. J., & Gremler D. D. (2008). *Services marketing.* United Kingdom: McGraw-Hill Education.

Yi. Y. (1990). A critical review of consumer satisfaction. In V. A. Zeithaml (ed.) *Review of Marketing* (pp. 68-82). Chicago: American Marketing Association.

Zappacosta, M. (2001). Information technologies for rural development: Between promises and mirages. *Information, 3*(6), 521-534. doi: http://dx.doi.org/10.1108/14636690110422285