

RESEARCH ARTICLE

Determinants of information needs of Sri Lankan vegetable farmers

M.G.P.P. Mahindaratna^{a*}

^aDepartment of Export Agriculture, Faculty of Animal Science and Export Agriculture, Uva Wellassa University, 90 000, Badulla, Sri Lanka

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*Correspondence: prasadkandy@yahoo.com

ABSTRACT

Agricultural information plays a pivotal role in achieving the quantitative and qualitative targets of agriculture. Potentials and significance of Information and Communication Technology (ICT) to improve agricultural information and knowledge dissemination systems have been widely accepted. Therefore, to get the full use of ICT to develop prolific agriculture information systems, it is paramount important to have a comprehensive understanding of the information need of the farmers. Acknowledging the existing knowledge gap with regards to the information needs of the vegetable farmers in Sri Lanka, the present study was designed to examine their information need and the determining factors. Wilson's general model of information seeking behaviour-1996 served as the theoretical framework for this study. Based on the theoretical framework and the past empirical studies, a structured questionnaire was designed to use in the farmer-survey. Using simple random sampling, a total of 289 vegetable farmers were interviewed with the questionnaire. A standard multiple linear regression was employed to evaluate the factors that affect farmers' information needs. The findings of the regression analysis revealed that the information need of vegetable farmers is significantly influenced by the production, marketing, environmental & health, legal & policy-related factors and as well as certain demographic, personal & role-related and socio-cultural factors. The findings suggest that it is vital to investigate the information needs of farmers in either improving the existing information systems or in designing new information systems.

Keywords: *Agricultural information need, Wilson's model of 1996, vegetable farmers, Sri Lanka*

INTRODUCTION

Agriculture in developing countries remains central for food production, generating income and employment, and also delivering essential environmental services. Without an exception, agriculture plays a vital role in the Sri Lankan economy, though the agriculture contribution to the national Gross Domestic Production (GDP) has been comparatively low as 7%, the agriculture contribution to the national employment is as high as 26.1% in overall and when it comes to rural areas, it is almost high as 60% (Labour Force Survey – Annual Report, 2017). Farming operations entail complex decision making, characterised by considerable levels of uncertainty and alternative courses of action (Recio *et al.*, 2003) which requires an array of information to be gathered from variable sources. Further, agricultural information is vital because it harnesses other production factors such as land, labour, capital, and management. The productivity of those factors can arguably be improved by, relevant, reliable and useful information (Demiryurek, 2010). Shepherd (2011) noted that farmers'

information needs have increased now than ever before due to less government intervention in the sector. In this context, agriculture informational systems have to play a pivotal role in facilitating the dissemination of agricultural information and knowledge among the farmers and other stakeholders.

Furthermore, unlike in the past, agriculture in the developing world, especially in South Asia, is becoming more knowledge-intensive than resource-intensive (Awuor *et al.*, 2013). Agriculture extension takes care of disseminating information and knowledge to the farmers. Agriculture Extension is a service or system which assists farm people through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting the social and educational standards of rural life (Maunder, 1972).

Over the past three decades, Information and Communication Technology (ICT) has tremendously influenced the agriculture information and knowledge systems. Accordingly, information access of farmers in developed countries has transformed over the past two decades through the increasing digitisation of the industry and government information and services (Starasts, 2015). However, the successful implementation of ICT-mediated agricultural information systems in developing countries is hindered by a set of design-related, economic and sociocultural factors (Kughur *et al.*, 2014; Aubert *et al.*, 2012). In this backdrop, it is a dire need to improve the existing agricultural information systems and to design new information systems that can better serve the growing information and knowledge demands of the farming communities. In such endeavour, Information and Communication Technologies (ICTs) can and must play a huge role.

In designing an information system, the emphasis should be placed less on design and more on learning what the farmers do and how they act, and not only letting researchers design their own views of farm management decisions (McCown, 2002). Further, learning about informational needs, intended users, user characteristics and tasks and analysing physical and social environment are some key best practices in user-centred designing (Johnson *et al.*, 2005). Assessing the farmers' information needs is a point of departure of any attempt to improve the availability of, and access to information among farmers (Elly and Silayo, 2013). Regular studies are important for updating farmers' information needs (Kalusopa, 2005) and such longitudinal studies are necessary because the levels of need for similar information may differ over time and between persons or groups depending on a variety of factors (Kaniki, 2001).

However, it is evident from the literature that, despite the vitality, relatively a limited number of studies have been carried out in developing countries to explore the farmers' information needs and seeking patterns within the changing information environment (Kaniki, 2001; Kalusopa, 2005; Elly and Silayo, 2013). The literature review further revealed that recent and sufficient studies have not been carried to explore the information needs of Sri Lankan farmers. To bridge this existing knowledge gap, as an initiation, the present

study was designed to explore the contemporary information needs and the determining factors relating to the vegetable farmers in Sri Lanka.

METHODOLOGY

Research design

A theoretical framework/model serves as the basic building blocks of a research study and helps in investigating and explaining the relationships among the variables concerned. Thus, theoretical framework/model improves the validity and reliability of a study, provides a basis for comparisons with other studies and paves the way for placing a study in a broader context (Fidel, 2012 and Case, 2012). However, in the literature survey, the present study found that many of the informational studies in agriculture have been carried out without reference to any specific theoretical framework or model. Thus, informational studies carried out in agriculture are diverse in terms of the concepts and methodologies adopted. As a result, the findings of those studies are not conclusive and also difficult to compare and generalize. Admitting the vitality, the present study adopted Wilson's general model of information seeking behaviour -1996 (Wilson, 1999) as the theoretical framework. Wilson's model of 1996 proposes that the information need of a seeker is triggered by the activating factors and it further influenced by a range of intervening variables. Accordingly, in this study, the information need of the farmers was considered as a function of related activating factors and intervening variables. Thus, a standard multiple linear regression analysis was conducted to evaluate the factors that affect the information need of farmers.

By refereeing to the past empirical studies carried out in similar contexts (e.g. Aziagba, 2011; Demiryurek, 2010; Elly and Silayo, 2013; Gunawardana and Sharma, 2007; Irvwier, 2007; Kabir *et al.*, 2014; Kavithaa *et al.*, 2014; Lokanathan and Kapugama, 2010; and Magesa, 2014), types of information needed by the farmers, activating factors, and the intervening variables were identified and then operationalized for evaluation. The information need of the vegetable farmers was treated as the dependent variable in the regression analysis. In order to determine the information needs of the vegetable farmers, 24 information dimensions were identified referring to the past studies carried out in similar context (*E.g.* Kabir *et al.*, 2014; Elly and Silayo, 2013; Lokanathan and Kapugama, 2012; Aziagba and Okede, 2011 and De Silva and Rathnadiwakara, 2010). To quantify the farmers' information need of vegetable farmers, Information Need Score (INS) was computed by adapting the method proposed by Kabir *et al.* (2014). Accordingly, the farmers were presented with the 24 information dimensions and were asked to evaluate them based on the degree of importance on a five-point Likert scale (0 to 4). The 24 information dimensions considered were the information on fertilizer (types, places to buy, cost), information on new and improved seed and planting materials, current/forecasted prices of specific crops in specific markets, information on agro-chemicals (types, places to buy, cost), labour information in the locality, information on buyers of transporters, weather and irrigation information, information on finance (sources, cost/ rates), information on pest and diseases and

controlling methods, information on safe disposal of agro-waste, information on soil fertility management and soil conservation, health and safety information related to agro chemical usage, agronomic practices (e.g., land preparation, cropping methods, etc.), information on post-harvest technologies, health and safety information related to occupational diseases, information on climatic change, adoption and mitigation, information on natural disasters (predictions and disaster communication), environmental friendly farming practices environment, information on related policies and regulations, information on new farming methods, equipment and tools, innovative farming methods and technologies, information on government subsidies, policies, programs, information on agri-business management and information on non-government services (training, subsidy, programmes). Thereafter, the INSS of farmers were computed by aggregating the relevant scores obtained for the 24 information need dimensions.

This study identified a range of activating factors and then they were categorised into four categories: production and technical factors, marketing factors, policy and legal factors, and environmental and health factors based on past empirical studies (e.g. Aziagba and Okede, 2011; De Silva and Rathnadiwakara, 2010; Gunawardana and Sharma, 2007; Ozowa, 1995). Hence, these activating factors and their uncertainty influence the information needs of the farmers. Under the production and technical factors, factors such as land extent, land ownership, number of crops per year, use of hired labour, the farming system adopted (mono-crop or multi-crop), formal loan application and production uncertainty faced were considered. The perceived production uncertainties (e.g. uncertainties relating to the material input supplies, pest and disease outbreaks, scientific and technical input and other supportive services) were determined by asking the farmers to evaluate their likelihood of occurrence on the five-point Likert scale. The mode of selling adopted (E.g. collectors, retail, wholesale and multiple modes) and the marketing uncertainty perceived were considered as the marketing factors. The perceived marketing uncertainty was determined by evaluating the level of uncertainty experienced in terms of input prices and supplies, output demand and prices, the introduction of new agro-chemicals, new seeds, and produce imported to the market using the five-point Likert scale. To determine the other two activating factors, environmental and health factors (e.g. climatic changes, natural disasters like floods and droughts and the occupational disease like the chronic kidney disease spreading among the farmers, etc.) and policy and legal factors (e.g., changes/introduction of new policies or regulations such as land policies, pricing policies, agrochemical use, disposal, waste disposal, etc.), perceived uncertainties relating to these factors were estimated by presenting the relevant statements and asking the farmers to evaluate them using a five-point Likert scale.

Intervening variables were also identified based on the findings of relevant empirical studies (E.g. Kabir *et al.*, 2014; Kavithaa *et al.*, 2014; Elly and Silayo, 2013; Lokanathan and Kapugama, 2012; Okwu and Daudu, 2011; Aziagba and Okede, 2011; Demiryurek, 2010 and Gunawardana and Sharma, 2007). In this study, intervening variables were considered under three broad categories: demographic, personal and role-related and socio-cultural. Under the demographic factors such as gender, age, education, farming income, number of telecommunication channels use, training received during the last five years, and

farming experience were considered. As of the personal and role-related variable, perception on agricultural information, style of decision making and information sharing behaviour were considered. The factors such as exchange of labour, exchange of tools, informal loan applications and membership in farmers' societies were considered under the socio-cultural variable.

Sample, data collection and analysis

Vegetable farmers were selected for this study considering their high levels of dynamism, information use and the uncertainties faced in the present context. Commercial vegetable production is taking place in two major zones: the up-country and low-country. Employing the stratified sampling technique, in proportionate to the extent of land under vegetable cultivation in the two zones, a total of 325 farmers were randomly selected with the assistance of government extension officers, leading farmers, and farmer society staff.

A structured questionnaire was designed to collect primary data based on the research design, and it was pre-tested with 20 farmers. The selected farmers were individually interviewed using the refined questionnaire and 289 interviews were successfully completed.

To determine the factors that influence the information need of farmers, Information needs score (INS) was regressed with the identified activating and intervening variables and the results of the regression analysis are presented in Table 2.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \epsilon$$

Where;

- Y = Information needs score (INS)
- X₁ = Land extent
- X₂ = Land Ownership (D1)
- X₃ = Crops per year
- X₄ = Use of hired labour
- X₅ = Farming system–(D2)
- X₆ = Formal loan application
- X₇ = Production uncertainty faced
- X₈ = Mode of Selling (D3)
- X₈ = Marketing uncertainty faced
- X₁₀ = Policy & legal uncertainty faced
- X₁₁ = Environmental & health uncertainty faced
- X₁₂ = Gender
- X₁₃ = Age (D4)
- X₁₄ = Education (D5)
- X₁₅ = Farmer income

- X₁₆ = No: of communication channels used
- X₁₇ = Training received in last 5 yrs.
- X₁₈ = Farming experience. (D6)
- X₁ = Perception of agri-information
- X₁₉ = Style of decision making
- X₂₀ = Information sharing behaviour
- X₂₁ = Exchange of labour
- X₂₂ = Exchange of tool
- X₂₃ = Informal loan application
- X₂₄ = Membership in farmers' societies
- ε = Error factor

Several scales were developed to measure certain variables used in the study. To evaluate the internal consistencies of those scales, the Cronbach's α test was performed. The resulting Cronbach's α coefficient values of the scales of the perceived production uncertainty, the perceived marketing uncertainty, the perceived policy and legal uncertainty, the perceived environmental and health uncertainty, the perception of agriculture information, the style of decision making and information sharing behaviour were 0.713, 0.701, 0.706, 0.688, 0.701, 0.780 and 0.698, respectively. Cronbach's alpha values of the measures needed to exceed 0.7 to qualify as reliable (Hair *et al.*, 1995). The Cronbach's alpha coefficients of five scales were above the cut-off level and the other two were very close to the cut-off.

RESULTS AND DISCUSSION

Demographic characteristics of the vegetable farmers

The demographic characteristics of the vegetable farmers are summarised in Table 1. The table shows the gender composition, age distribution, education level, family size, farming experience, society membership status, hired labour use, application of loans, telecommunication use, farmland extent and monthly income of the respondent farmers.

Factors influencing information need of the vegetable farmers

According to the regression results (Table 2), of the production-related activating factors considered, the land extent, land ownership, and perceived production uncertainty showed a significant relationship with the INS of the vegetable farmers, whereas crops per year, use of hired labour, the farming system adopted and formal loan application did not.

Table 1: Demographic profile of the vegetable farmers (289).

Variables	Sample statistics
Gender	
Male (%)	84.0
Female (%)	16.0
Age groups	
Young (below 35 yrs.) (%)	18.7
Middle (35 – 55 yrs.) (%)	61.6
Old (above 55 yrs.) (%)	19.7
Education	
Less than Grade 8 (%)	46.0
Ordinary levels (%)	37.0
Advanced levels and above (%)	17.0
Avg. Family size	4.6 (std-1.1)
Farming experience (yrs.)	
Less than 5 (%)	9.4
6 – 15 (%)	10.4
Above 15 (%)	80.2
Farmers' society membership	
Members (%)	66.4
Non-members (%)	33.6
Hired labour	
Use (%)	90.6
Do not use (%)	9.4
Variables	Sample statistics
Farming loan applications	
Informal only (%)	4.8
Formal only (%)	25.3
Both (%)	41.5
None (%)	28.5
Telecommunication use	
Radio (%)	88.2
Television (%)	91.7
Mobile phone (%)	86.5
Landline (%)	39.1

Internet (%)	10.0
Avg. farm size (Acre)	1.8 (SD 1.37)
Farm ownership status	
Personally owned (%)	33.2
Family owned (%)	39.4
Rented (%)	8.3
Multiple status (%)	19.1
Avg. monthly farming income (USD)	133.5 (SD 67.7)

The INS has a significant positive relationship (0.116 at the 0.05 alpha level) with the extent of land and this relationship indicates that when the land size increases, farmers require more information to make their farming decisions. The INS of farmers also showed a significant positive relationship (0.091 at the 0.05 alpha level) with the rented land ownership in comparison to personally-owned land. This relationship suggests that when doing farming in the rented land, farmers seek more information to make informed farming decisions since they have to ensure the payment of rents. Furthermore, the INS of farmers exhibits a relatively a strong positive and significant relationship (0.307 at the 0.05 alpha level) with the perceived production uncertainty. This relationship reveals that production related uncertainties significantly impact farmers' information needs. Ozowa (1995), Iriwieri (2007) and Lokanathan and Kapugama (2012) also have confirmed the same relationships. Concerning marketing-related activating factors considered, both the mode of selling and the perceived marketing uncertainty showed a significant relationship with the INS of farmers. Thus, the INS of farmers has a significant positive relationship with the mode of wholesale (0.132 at the 0.05 alpha level) and multiple modes (0.094 at the 0.05 alpha level) in comparison to selling through collectors. These relationships are plausible because farmers compel to look for more information (buyers, prices, transport etc.).

According to the findings, the perceived marketing uncertainty has a relatively high and significant positive impact (0.331 at the 0.05 alpha level) on the INS of the farmers. In developing countries, farmers are vulnerable in terms of accessing market information (Elly and Silayo, 2013 and Magesa *et al.*, 2014), and therefore, farmers regularly seek out market information.

According to the findings (Table 2), the INS of farmers also shows a significant and positive (0.184 at the 0.05 alpha level) with the policy & legal uncertainty faced by the farmers. This is also a plausible relationship because when the changes taking place in the policy and regulatory environment in the agriculture (e.g. land policies, pricing policies, agrochemical use, disposal, waste disposal, etc.), farmers need to be informed about such changes promptly. Furthermore, the INS of farmers

exhibits a significant and positive (0.186 at the 0.05 alpha level) with environmental and health uncertainty encountered by the farmers. This indicates that changes in the environmental and health issues pertaining to agriculture influence the information needs of farmers.

Table 2: Results of regression analysis (289).

Independent variable	SE	Beta	Sig.
Land extent z	0.406	0.116	0.017*
Family-owned farmland (D1)	1.329	0.094	0.099
Rented farmland (D1)	1.926	0.091	0.050*
Multiple ownerships (D1)	1.611	0.012	0.826
Use of hired labour	1.792	0.047	0.305
Mono-crop farming system–	1.095	-0.018	0.684
Formal loan application	1.226	-0.085	0.092
Production uncertainty faced	0.217	0.307	0.000*
Retail (D3)	2.386	0.010	0.833
Wholesale (D3)	1.209	0.132	0.012*
Multiple modes (D3)	2.265	0.094	0.038*
Marketing uncertainty faced	0.376	0.331	0.000*
Policy & legal uncertainty faced	0.411	0.184	0.000*
Environmental & health	0.413	0.186	0.045*
Gender	6.780	0.019	0.725
Young-aged (D4)	1.439	-0.023	0.617
Middle-aged (D4)	1.286	0.046	0.298
Education - up to O/L (D5)	1.127	0.051	0.282
Education - A/L and above	1.456	0.031	0.516
Farmer income	0.027	0.049	0.307
No: of communication	0.509	0.097	0.026*
Training received in last 5 yrs.	0.989	-0.012	0.779
Farming experience 6-15 yrs.	1.981	-0.046	0.508
Farming experience above 15	1.886	-0.009	0.900
Perception of agri-information	0.230	0.188	0.041*
Style of decision making	0.258	0.056	0.249
Information sharing behaviour	0.411	-0.033	0.503

Exchange of labour	1.157	-0.006	0.902
Exchange of tool	1.384	-0.039	0.354
Informal loan application	1.138	0.125	0.012*
Membership in farmers'	1.165	0.004	0.931
R- squared	0.701		
Adjusted R- squared	0.637		

Notes:

D - dummy variables (D1 - in comparison to personally- owned land; D2 - in comparison to multi-crop farming system; D3 - in comparison to mode of selling through collectors; D4 - in comparison to old-aged; D5 - in comparison to education received up to grade 8 and, D6 - in comparison to experience less than 5 years).

* indicates significant at the 0.05 significance level

Of the range of intervening variables considered, only the number of communication channels use, the perception of agriculture information (personal and role-related) and informal loan application (socio-cultural) have a significant impact on the INS of the farmers. Considering the intervening variables is very important because the information need is context- specific. The variables that didn't show a significant impact on information needs in one context may exhibit a significant impact in a different context.

CONCLUSIONS

This study was designed to investigate the factors that determine the information need of vegetable farmers. Most of the information related studies in agriculture have been carried out without reference to any theoretical framework or model. This study adopted Wilson's general model for information seeking behaviour -1996 as the theoretical framework. Referring to the theoretical framework and empirical literature, the study identified an array of factors that could have an impact on the information need of vegetable farmers. To evaluate the impacts of the identified factors on the information need of vegetable farmers, a standard multiple linear regression analysis was employed. The regression analysis revealed that the information need of score (INS) is significantly influenced by the production, marketing, environmental & health, legal & policy related factors and, certain demographic, personal and role-related and socio-cultural factors. The findings of this study suggest that in improving the existing information systems or in designing new information systems for farmers, it is vital to investigate the different types of information needed by them and the factors that govern that information needs.

Findings of this study will inform the agriculture policymakers, information systems/applications designers, extensionists and educators, and researchers.

Furthermore, this study will stimulate similar studies on exploring the information need among farmers in developing countries.

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