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Critical factors of farmers's participation in kenaf cultivation: Malaysian context

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The Malaysian government has given support and priority to Kenaf as a new national commodity. However, the progress in Kenaf cultivation has not met the expectation of the government. The main objective of this study is to determine the critical factors influencing the limited farmer participations in Kenaf cultivation. Data were collected through interviews using a structured questionnaire that is designed to map out the farmers perspective with respect to this matter. Factor analysis indicates that there are six significant influential factors including inadequate economic potentials in Kenaf cultivation, strategicness of tobacco cultivation, grievances over Kenaf cultivation, farmers' perspectives in changing crop cultivation, challenges in market assurances and inadequate Kenaf cultivation campaign and promotion to farmers. The government has to take note and resolve these critical factors to encourage Kenaf cultivation by farmers.

Key words: Natural fiber, Kenaf cultivation, critical factors, factor analysis, farmer participation.

INTRODUCTION

Kenaf (*Hibiscus cannabinus*) from the Malvaceae family is easy to grow, has high photosynthesis rate, and is used as raw material in many applications such as industrial building material for board production and bio-composite products. Kenaf can be planted all year round in Malaysia because of the tropical climate with the temperatures ranging from 20 to 30°C. It has been treated as a new commodity and source of growth in Malaysia to diversify the country's commodities sector. Under the East Coast Economic Region (Malaysian Industry–Government Group for High Technology (MIGHT), 2011), Kenaf crop is included as one of the potential crops to be developed as the 7th Malaysian commodity (MIGHT, 2011). Due to the 5% reduction in import duties brought about by the enforcements of the Asean Free Trade Agreement (AFTA) and the eventual decline in imported tobacco prices, an estimated 5000 tobacco farmers have to consider replacing tobacco with alternative crops in Malaysia (Toreksulong, 2010). Kenaf could be a potential crop for this purpose. The conversion

of the National Tobacco Board (NTB) to the National Kenaf and Tobacco Board (NKTB) shows the Government's commitment in encouraging the development of the Kenaf industry. In support of this move, NKTB allocated some financial resources (i) to provide incentives that could attract farmers to plant Kenaf and for the industry to use this natural fibre as a raw material, and (ii) to carry out research and development (R and D) activities on Kenaf cultivation and Kenaf fibre utilisation. Under the NKTB's Kenaf Development Program 2010, small-scale farmers could receive a cultivation incentive of RM6, 400 per hectare to cover for expenditures on land rental, seeds, fertilizers, pesticides and labour cost. NKTB also provides basic farm infrastructures comprising of roads, irrigation system, and water management system at the planting site. Kenaf has a huge potential in the Malaysian industry, especially, in the application of bio-composite products such as chipboard, fibreboard, fibre reinforced plastic composite (FRPC), and Kenaf oriented board, into light weight and high performance products, such as for the automotive industry and the anti ballistic products (MIGHT, 2011). Towards attaining this development goal, universities and research institutions are provided R and D grants to generate fundamental and innovative crop

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Table 1. KMO and Barlett's test.

Kaiser-Meyer-Olkin measure of sampling adequacy	0.822
Bartlett's test of sphericity	1130.554
Significant level	<0.0001

*Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity (BTS) are applied in order to validate if the variables are factorable; *KMO greater than 0.5 for a satisfactory factor analysis.

cultivation and fibre processing solutions. Despite, the provision of the aforementioned incentives and supports, progress in Kenaf cultivation and processing has not met the expectation of the Government. The farmers are still not embracing Kenaf as a commodity crop and the return is still not lucrative in comparison to selected cash crops like water melon.

Previous studies focused more on the problem with the production yields (Webber and Bledsoe, 2002), the potential of Kenaf as a dry land crop (Nielsen, 2004), the lack of awareness and knowledge on the crop agronomy (Matata et al., 2010), the characterisation of Kenaf accessions (Balogun et al., 2008), the technical performance of the fibre (Muir, 2002), and the feasibility for pulp and paper manufacturing (Szabo et al., 2009). The purpose of this study is to determine the critical factors influencing the inadequate participation of rural folks in Kenaf cultivation. The findings from this study could provide analytical information for the government to make informed decisions to resolve issues on Kenaf development in Malaysia.

MATERIALS AND METHODS

Data were collected through interviews on two types of farmers, tobacco farmers and ex-tobacco farmers. Structured questionnaire was used to collect primary data on the respondents' perspective in Kenaf cultivation. A total of 100 respondents have been randomly interviewed from a population of farmers, which are either currently or previously engaged in cultivating tobacco from three areas in Kelantan namely Tok Bali, Pasir Puteh and Bachok. With the trade liberalisation of AFTA policy taking effect in 2010, farmers need to replace tobacco crops with the reduction in import duties on tobacco. It would be interesting to know to what extent these tobacco farmers select Kenaf and if not, what motivates them into selecting other crops. Hence, this study would enable an understanding of the critical factors affecting farmer's willingness (or unwillingness) to participate in Kenaf cultivation. Previous studies have highlighted many issues and challenges faced in crop cultivation including poor geographical location (Ching et al., 1993; Wood et al., 1983), the lack of awareness and knowledge on the crop (Matata et al., 2010), the types of insect pest (Okunlala and Ofuya, 2010), low yield and poor quality seeds (Ching et al., 1993). Not all the aforementioned issues or factors are equally dominating and significant in influencing farmer's decisions in crop cultivation. There is a need to rank these factors in order of importance and cluster relatively similar issues. Factors analysis is one method to undertake this assignment.

Factor analysis is a statistical technique that is used to reduce data and information to a smaller set of summarised variables and to explore the underlining theoretical structure of the phenomena.

Done correctly, factor analysis is used to identify the structure of the relationship between the variables and the respondent. Studies showed that two or more factors from an initial larger list of variables can be determined to critically influence a phenomenon (Fadhil, 2010; Ocal et al., 2007; Topcu et al., 2010). Factor analysis can be performed by examining the pattern of correlations between the observed measures. Measurements that are highly correlated are influenced by the same factor, while those that are relatively uncorrelated are likely to be influenced by different factors. The basic model for factor analysis used by MohdShahwahid et al. (2010) is also applied in this study:

$$Z = b_1x_1 + b_2x_2 + \text{.......} + b_nx_n$$

Where,
Z is a linear combination of principal components x_1 , x_2.....x_n are variables that are highly correlated with each other; and b_1, b_2...... b_n are coefficients of the above variables.

There are three steps in factor analysis. Firstly, is to obtain the initial solution. Variables are selected and the correlation matrix for the entire variables is obtained. An inter-correlation matrix is a k × k (where k equals the number of the variables) array of the correlation coefficients of the variables with each other. The Cronbach's Alpha reliable test was applied then to measure if the scales that have been constructed are reliable or valid. Then, Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity (BTS) were later applied in order to validate if the variables are factorable. The KMO value should be greater than 0.5 for a satisfactory factor analysis and BTS are conducted to test the hypothesis that the variables are uncorrelated. The second step involves the extracting of the factors. An appropriate number of factors are extracted from the correlation matrix based on the initial solution. The Eigen value of factors should be greater than or equal to 1.0 if they are to be extracted. The third step is rotating the factors. One or more variables can be loaded in more than one factor and make the interpretation of the factors ambiguous such that the factor is rotated in order to clarify the relationship between the variables and the factors.

RESULTS AND DISCUSSION

In this paper, the reliability test was conducted using 31 samples. The result shows that the questions are reliable since a Cronbach's Alpha value of 0.846 was obtained which is greater than 0.70 that is often used as a critical level. Table 1 shows that the 0.822 KMO measure is also acceptable. It was concluded that the data is appropriate to conduct factor analysis and the degree of common variance is meritorious whereby the factors extracted would account for a substantial amount of the variance in farmers' willingness to participate in Kenaf cultivation. The Barlett's Test of sphericity is moderately high with

Table 2. Total variances explained.

Component		Initial Eigenvalues		
		Total	% of Variance	Cumulative %
dimension0	1	6.245	28.385	28.385
	2	3.962	18.009	46.394
	3	2.141	9.733	56.127
	4	1.302	5.920	62.047
	5	1.092	4.963	67.010
	6	1.018	4.629	71.639

1130.55 which is statistically significant at 1% level. From Table 2, there are six components extracted based on Eigen values greater than one.

Table 3 shows the summary for the factor analysis. These factors are economic potential in Kenaf cultivation, strategicness of tobacco cultivation, grievances over Kenaf cultivation, farmers' perspectives on changing crop cultivation, challenges on market assurance and campaign, and promoting Kenaf cultivation.

The first factor which had the strongest variation explanation level (28.385%) is "the economic potentials". The factors include five variables, namely; build more mills (0.864), efficient management (0.857), fixed Kenaf price (0.807), provision of more government incentives (0.754), and market opportunities from new product development (0.510). The result indicates that Kenaf cultivation could attract more farmers if government build more processing mills nearest to planting areas. This result is similar with Hansson and Ferguson (2010) who suggested that mills located nearest to farms will raise the production and farmer interests to participate in any cultivation. Related to this point, a strategy of forming a Collection, Processing and Packaging Centre (CPPC) is often suggested in Kenaf development to act as a one stop centre for processing inputs to ensure quality of products and to reduce post-harvest losses (MIGHT, 2011). Increases in efficiency and systematic management could improve the performance of Kenaf cultivation. The other potential factors like fixed Kenaf prices, more government incentives and the creation market opportunities for new products domestically and globally would also catch the attention and interest of farmers and industry players.

The second factor is termed "strategicness of tobacco cultivation" which accounted for 18.009% of the total variance. The factor includes four variables explaining why farmers still plant tobacco: tobacco market in Malaysia still exists and is prospering (0.841), areas in Bachok, Tok Bali, and Pasir Puteh are only suitable for tobacco cultivation (0.764), tobacco crops still provide more profits than other crops even without subsidies from the Malaysian Government (0.753), and tobacco cultivation has improved the standard of living of farmers who are mostly from poor families (0.695). To shift this dependence upon tobacco cultivation, the last variable

provides a clue for the government to do more campaigns in raising the farmer's interest in Kenaf cultivation as a means to overcome poverty. To attract more farmers' involvement in Kenaf cultivation, there is a need to know farmer's main interests in cultivating any crop.

The third factor had 9.733% of the total variance and is termed "grievances over Kenaf cultivation". This factor contains four variables; farmers' perception (0.800), unstable market (0.793), inadequate land and harvesting machinery (0.697), and lack of campaign and training opportunities on Kenaf cultivation (0.550). Campaigns by relevant authorities will raise the farmer's knowledge and interest on Kenaf and adequate training will increase the potential of farmers' participation in Kenaf cultivation.

The fourth factor is termed "Farmers perspectives on changing crop cultivation" which had 5.920% of the total variance. This factor included five variables; negative perception on Kenaf (0.684), farmer's tradition in tobacco cultivation (0.668), more capital investment requirement (0.645), farmers not interested to replace tobacco with Kenaf (0.559), and most of the respondents do not have any information on Kenaf cultivation (0.552). Farmers have long been entrenched with tobacco cultivation. Negative perception of Kenaf together with the thought of injecting new investments and uncertainties in cultivation are discouraging farmers' participation in Kenaf cultivation.

The fifth factor named "challenges for market assurance" had accounted 4.963% of the total variance. This factor includes three variables; raise more market prospect for Kenaf (0.802), expectation of responsible authorities (0.747) and raise market opportunities from new product development (0.540). All the three variables provided the future challenges for rural development that the responsible government agencies have to face to support Kenaf development.

The last factor (campaign and promotion on kenaf) which had a total variance of 4.629% included three variables; inadequate information on Kenaf cultivation (0.525), the potential of Kenaf (0.871), and the government policy in tobacco cultivation (0.586). The reduction of import duties as a result of AFTA has reduced domestic tobacco prices discouraging the cultivation of tobacco. With more campaigns and information,

Table 3. Summary of factor analysis result.

No.	Dimension (Factor) (Sub-variables)	Sub-variables loading	Variance (% of explained) (Eigen values)
	Economic potentials in Kenaf cultivation		28.385 (6.245)
	Build more mills	0.864	
1	Efficient management	0.857	
	Fixed Kenaf prices	0.807	
	More Government incentives	0.754	
	Market opportunities from product development	0.510	
	Strategicness of tobacco cultivation		18.009 [3.962]
	Market in tobacco cultivation	0.841	
	Places in tobacco cultivation	0.764	
2	Income in tobacco cultivation	0.753	
	Improved standard of living in tobacco cultivation	0.695	
	Inadequate campaign and training development on Kenaf cultivation	0.510	
	Grievances over Kenaf cultivation		9.733 (2.141)
	Negative perceptions on Kenaf	0.800	
	Unstable market in Kenaf	0.793	
3	Inadequate machinery and land	0.697	
	Inadequate campaign and training development on Kenaf cultivation	0.550	
	Farmers perspectives on changing crop cultivation		5.920 (1.302)
	Negative perception on Kenaf cultivation	0.684	
	Tradition in tobacco cultivation	0.668	
4	More capital investment in Kenaf cultivation	0.645	
	Farmers are not keen to replace tobacco with Kenaf	0.559	
	Less information on Kenaf	0.552	
	Challenges on market assurances		4.963 (1.092)
	Create more market prospect	0.802	
5	Authority is responsible to market	0.747	
	Business market opportunities	0.540	
	Campaign and promotion on Kenaf		4.629 (1.018)
	Less information on Kenaf cultivation	0.525	
6	Less information on Kenaf potential	0.871	
	Government policy on tobacco cultivation	0.586	
Total of variance explained			71.639

dissemination on Kenaf to farmers would promote Kenaf cultivation.

Conclusion

This study was conducted to analyse the critical factors that are influencing farmers on involvement in Kenaf cultivation using data collected from current tobacco and ex-tobacco farmers from Tok Bali, Bachok and Pasir Puteh, Kelantan, Malaysia. Results from the factor analysis showed that there are six factors that would influence farmers in their involvement in Kenaf cultivation. They are economic potentials in Kenaf cultivation, strategicness of tobacco cultivation, grievances over Kenaf cultivation, farmers' perspectives in changing crop to cultivate, challenges on marker assurances, and campaign and promotion on Kenaf. The government in particular, the National Kenaf and Timber Board (NKTB) has to take note of these critical factors. All these factors are relevant and have to be amenably tackled to raise farmers' participation in Kenaf cultivation. NKTB has to

draft out strategies and measures to overcome these concerns.

The limitation in this study is that a high proportion of the respondents did not have sufficient knowledge on Kenaf cultivation and this in a way, limits their understanding and interest in Kenaf. A more concerted effort by the government in general and by NKTB specifically, is needed to raise awareness and knowledge on Kenaf cultivation among farmers. Farmers' uncertainties over the prospect of Kenaf have to be corrected. A more innovative government approach is needed to support the cultivation and harvesting of the crop and in ensuring a proper market channel and pricing system. To make sure that Kenaf can compete with other crops like oil palm and tobacco, the government should develop it more and provide appropriate management and agronomic supports to Kenaf cultivators.

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