

Predicting Ghanaian farmers' intention to sustain the supply of quality cocoa beans

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Abstract

This article discusses the predictors of Ghanaian cocoa producers' intention to continue adopting a recommended cocoa bean fermentation technology in the future. The analyses is carried out within the framework of the theory of planned behaviour. Three hundred and twenty-one cocoa producers were interviewed. Consistent with literature, attitudes, subjective norms and past behaviour were significant predictors of fermentation intentions. Positive attitude relate to beliefs about ease of use of technologies and existence of non-financial rewards. Negative attitudes relate to lack of direct financial rewards. Purchasing Clerks, Chief Farmers and society at large were found to be the salient social referents who shape producers' fermentation intentions. Recommendations included improving implementation of current producer incentive regimes, promoting trust between producers and purchasing clerks and strengthening producer association to increase the sphere of influence of the Chief Farmers.

Keywords

Adoption—Agriculture—Attitudes—Technology—Theory of Planned Behaviour—Quality

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1. INTRODUCTION

Scientists recommend that, for the best quality produce, cocoa producers should ferment their freshly harvested cocoa beans for 6-7 days, during which the fermentation heaps are to be turned twice [1]. Historically, adoption rates of this quality-enhancing fermentation technology among Ghanaian cocoa producers have been high [2]. This high rate of adoption of fermentation technology explains Ghana's leadership in the export of premium quality cocoa beans since the 1950s [3]. Notwithstanding the consistent supply of premium quality cocoa beans, recent evidence suggests that under certain conditions,

Ghanaian producers could shirk from adopting recommended fermentation technologies. A peculiar example occurred in the 2006/7 season where almost all cocoa beans produced in Ghana fell short of quality standards [4].

The problem of shirking from adoption is one of intentions. A better understanding of the key factors that influence cocoa producers' fermentation intentions is therefore important for policy. The cocoa technology adoption literature in Ghana [1, 5] however fails to address producers' intentions, especially with regards to fermentation. Also, in estimating the likelihood of technology uptake among Ghanaian cocoa producers, past adoption is used as a proxy instead of a determinant of future adoption decisions [1, 5, 6, 7]. While the scientific community accepts this practice, a growing strand of literature argues that intentions precede adoption, and previous behaviour is a predictor of intentions instead of a measure of future decision [8].

This paper departs from the above-mentioned methodological approaches and concentrates on intentions of future adoption by Ghana cocoa producers. The theoretical foundation of the analyses in this paper is drawn from the socio-psychological Theory of Planned Behaviour (TPB) [9-11]. This theory argues that human behaviour is often preceded by intentions. The intention to behave in certain ways is influenced by three kinds of consideration: attitudes, perceived social pressure and perceived level of control over carrying out the behaviour in question.

Although the TPB has been successfully applied to agriculture, [11, 12, 13, 14] its application in the Ghanaian context is limited [?, 16]. Even fewer studies have anal-

ysed cocoa producers' behaviour with respect to TPB or its related constructs [17, 18, 19]. These studies confirm a number of the TPB perspectives on agricultural producers' intentions: (i) intention is a significant antecedent of adoption behaviour [16]; (ii) agricultural producers with more positive attitudes form stronger adoption intentions [20, 21]. Attitudes of Ghana cocoa producers regarding certain aspects of production can be negative [18]; (iii) salient social referents such as extension workers, producer associations, produce buyers important community personalities shape agricultural producers' decisions [22, 23, 24]; (iv) confidence and control over farm decisions and use of recommended technologies influences intentions [25, 26].

These studies confirm the efficacy of the TPB in predicting producers' intentions, but do not explain the determinants of cocoa producer intentions. The question of how to forestall future shirking behaviour of producers, with respect to appropriately fermenting their produce, still not fully answered. The central objective of this paper is therefore to fill this gap in knowledge. Specifically, this paper asks one question: to what extent do past behaviours, attitudes, subjective norms and perceived behavioural control influence the intentions of cocoa producers in Ghana to adopt recommended cocoa bean fermentation technologies? The principal contribution of this paper is that it opens the discussion on the future adoption intentions among Ghanaian, and for that matter African, agricultural producers. Furthermore, the outcome of this study is relevant because it contributes to the policy debate about how to nudge cocoa producers to sustain Ghana's premium cocoa bean quality status.

2. MATERIAL AND METHODS

2.1 Sample

Data were collected from a total sample of three hundred and twenty-one (321) cocoa producers between December 2011 and February 2012 using a multi-stage cluster sampling procedure. A cocoa producer was defined as one who possessed the right to make husbandry decision for the farm and earns at least a third of the crop. This right could have been transferred to the producer through land ownership or a tenancy arrangement. Three cocoa districts (Assin Foso in the Central Region, Suhum in the Eastern Region and Dormaa in the Brong Ahafo region) were selected using the simple random process. Within each cocoa district, three communities were further selected at random. Next, snowballing techniques were used to identify a minimum of forty cocoa producers for interview.

Data were solicited using a structured TPB questionnaire. The TPB questionnaire was constructed in two distinct stages. In the first stage, data from the focus group discussions were conducted by Quarmin et. al. [27] were assessed to identify key attitudinal, normative

and control beliefs as well as social referents and other relevant information about cocoa bean fermentation practices. In the second stage, the information from the focus groups discussions was summarized and built into a draft structured questionnaire which was subsequently pre-tested.

2.2 Theoretical framework

The theory of planned behaviour suggests that behaviour, in this case fermentation of fresh cocoa beans for 6-7 days with two turnings, is immediately preceded by the intention [12, 28, 29, 30]. There are three direct determinants of intention - one's attitude, subjective norm, and perceived control. An attitude toward a behaviour is defined as one's positive or negative evaluation of the particular behaviour based on beliefs. One's subjective norm is his/her perception of social pressure to comply with a given behaviour. Subjective norms depends on whether important social referents approve or disapprove of the behaviour in question. Perceived behavioural control is one's assessment of his/her ability to perform the behaviour in question [14]. Often linked to perceived behavioural control is the concept of self-efficacy, which refers to the confidence in one's ability to carry out a given behaviour [26].

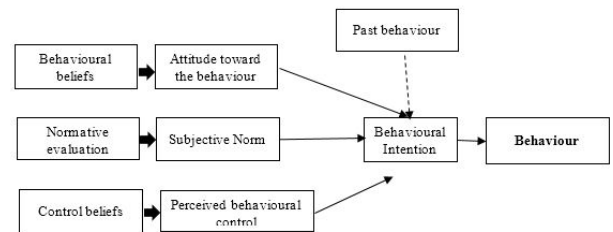


Figure 1. Structural model of the theory of planned behaviour with past behaviour

2.3 Main measures

Each TPB variable was measured by asking producers the extent to which they agree or disagree with a set of closely-related statements or items. Each statement was measured on a 7-point scale; strongly disagree (1) strongly agree (+7). The mean agreements for each set of statements was score of the variable (see TABLE 4 for of the statements under each variable). The Past behaviour was a dummy variable with 1 being equal to adopting recommended fermentation technology already during the season and 0 otherwise.

2.4 Analytical methods

The analytical path for this study followed three steps. In the first step, the background characteristics of respondents were assessed through descriptive statistics. The second step assessed the validity and reliability of

the TPB constructs. To achieve this, reliability analyses was conducted using Cronbach's Alpha estimation. Cronbach's alpha values range between 0 and 1. Cronbach's alpha values ranging from 0.75 to 1 are considered to be high and the scales associated with them are reliable. However some studies allow for much lower alpha values [31]. Also, the extent of correlation between TPB variables and past behaviour was assessed using Pearson correlation coefficients. Since the past behaviour variable was categorical and the TPB variables were means, the point biserial method, which is an adaptation of the Pearson correlation, was employed.

The third analytical step employed hierarchical regression analyses (HRA) to test the effect of TPB variables and past fermentation behaviour on intentions. The intention variable was first regressed onto attitude, subjective norms and perceived behavioural control to calculate the extent to which they explain variables in fermentation intentions. Secondly, past behaviour was now included in the model. The difference in the R-squared statistics, was used as a criteria to determine the unique contributions of past behaviour in explaining producers' fermentation intentions.

3. RESULTS

3.1 Description of the sample

Respondents tended to be male, married and mostly non-land owners in various tenure contracts (TABLE 1). The average sampled farmer was 53 years, and had been involved in cocoa farming for 22 years. He owned a 5 ha farm which yields about 5 bags per year and contributes an estimated 64% of his total household income.

Table 1. Sample characteristics

	% Sample (N=321)
Gender	
Male	74.8
Female	25.2
Marital status	
Married/free union	74.5
Not presently married	25.5
Tenure contract	
Owner	30.8
Abumu	25.5
Abusa	27.4
Hired labourer	16.2
	Mean (Std. Error)
Age	53.30 (0.610)
Years of farming	22.08 (0.668)
Size of cocoa farm	5.15 (0.191)
Proportion of cocoa in household income (%)	64.32 (1.039)
Yield (bags)	3.25 (0.149)

Source: Field Data, December 2011 and February 2012

3.2 Validity of the TPB scales

TABLE 2 reports Cronbach's alpha coefficients for all the TPB variables. The intention ($\alpha = 0.807$), attitude scale ($\alpha = 0.917$), and subjective norm ($\alpha = 0.933$) constructs recorded robust reliability results. The reliability results for the perceived behavioural control scale ($\alpha = 0.540$)

Table 2. Descriptive (means and correlations) and reliability statistics of PB constructs

	Mean scores		Reliability		Correlation			
	Mean	Std. dev	Cronbach's α	INT	ATT	SN	PBC	PBEH
INT	4.7	1.488	0.807	-	-	-	-	-
ATT	4.8	1.648	0.917	0.809***	-	-	-	-
SN	3.7	1.444	0.933	0.543***	0.464***	-	-	-
PBC	4.0	0.917	0.540	0.191***	0.201***	0.162***	-	-
PBEH	0.8	0.366		0.640***	0.540***	0.376***	0.270***	-

*** $p < 0.01$ INT = Fermentation intention, ATT = Attitudes, SN = subjective norms, PBC = PBC, PBEH = past behaviour.

was less than the generally acceptable alpha of 0.7 and above. However following Aaron and Aaron (1998), it was treated as acceptable in this study. From the correlation matrix reported in TABLE 2, the independent variables were found to be significantly correlated with producers' fermentation intention ($r = 0.191 \sim 0.809, p < 0.01$) and between themselves ($r = 0.162 \sim 0.540, p < 0.01$).

3.3 Rating of strength of influence of TPB variables

The results in TABLE 2 show that on the average cocoa producers reported high fermentation intentions (Mean = 4.7, SD = 1.488, Strength = 67%). The strength indicator is calculated by converting means into percentages. Respondents reported high average attitude scores (Mean = 4.8, SD = 1.648, Strength = 68%), relatively low subjective norms scores (Mean = 3.7, SD = 1.444, Strength = 53%) and moderately high perceived behavioural control scores (Mean = 4.03, SD = 0.192, Strength = 58%).

3.4 Prediction of intention

TABLE 3 present results of two models of hierarchical regression. In the first model, only TPB variables were entered simultaneously into a simple regression equation. The overall model was significant, with all three variables accounting for 69% of the variance in intentions ($R^2 = 0.690$; $F = 235.662, p < 0.01$). Attitudes ($\beta = 0.708, p < 0.01$) and subjective norms ($\beta = 0.212, p < 0.01$) significantly explained the variance in the fermentation intentions variable.

Table 3. Hierarchical regression analysis: Variables predicting intention

	B	Beta	R	R-Squared	F-Statistic
Model 1					
C	0.851				
ATT	0.639	0.708***			
SN	0.218	0.212***			
PBC	0.023	0.014	0.831	0.69	235.662***
Model 2					
C	0.853				
ATT	0.535	0.593***			
SN	0.179	0.174***			
PBC	-0.044	-0.027			
PBEH	1.063	0.262***	0.858	0.736	220.13

*** $p < 0.01$ INT = Fermentation intention, ATT = Attitudes, SN = subjective norms, PBC = PBC, PBEH = past behaviour.

To estimate the unique contribution of past behaviour, it was included in the second model together with the

TPB variables (Model 2 in TABLE 3). The model was significant ($R^2 = 0.736$; $F = 220.130$, $p < 0.01$). The change in R^2 between Model I and Model II of 4.6% reveals the extent to which past behaviour improved the theoretical model to explain fermentation intentions. Previous behaviour as a variable in Model II was a significant predictor of fermentation intentions ($\beta = 0.262$, $p < 0.01$).

Table 4. Ranked drivers of producer's intention

	Mean	Std. Dev	Correlation with Intention variable
SALIENT ATTITUDINAL BELIEFS			
There are non-financial benefits	5	1.839	0.780***
It is not time consuming	4.22	1.941	0.725***
It is practical	4.93	1.766	0.696***
There are financial rewards	3	1.817	-0.695***
SALIENT SOCIAL REFERENTS			
Society as a whole	4.74	1.841	0.719***
Regular Purchasing Clerk	3.89	1.794	0.646***
Chief Farmer	3.58	1.916	0.475***
Cocoa Extension Officer	2.91	1.694	0.389***

Source: Field Data, December 2011 and February 2012

TABLE 4 reports the specific attitudinal belief and social referents which promote or block fermentation intention formation. With respect to the attitudinal beliefs statements, the idea that there exists some non-financial rewards for adopting cocoa fermentation recommendation was highly rated (Mean = 5.00, SD = 1.839) and had the strongest positive association with the intentions variable ($r = 0.780$, $p < 0.01$). The belief that recommended fermentation technologies are not overly time consuming was moderate (Mean = 4.22, SD = 1.94) but strongly associated with fermentation intention variable ($r = 0.725$, $p < 0.01$). The attitudinal belief that adopting recommended fermentation technology is practical and achievable was strong (Mean = 4.93, SD = 1.766) and positively associated with fermentation intention variable ($r = 0.696$, $p < 0.01$). The belief that there are financial rewards received negative rating (Mean = 3.00, SD = 1.820) and correlated negatively with fermentation intention variable ($r = -0.695$, $p < 0.01$).

Regarding significant social referents in the subjective norms construct, all six identified referents listed were positively associated with intention score (TABLE 4). Society as a whole was rated by respondents as the most important subjective norms driver of fermentation decisions (Mean = 4.74, SD = 1.841), with strong positive association with producers' fermentation intentions ($r = 0.719$, $p < 0.01$). Two other social referents with moderate rating by respondents were purchasing clerks (Mean = 3.89, SD = 1.794) and the Chief Farmers (Mean = 3.59, SD = 1.916). These two referents were strongly associated with producers' intention ($r = 0.646$ and $r = 0.475$ respectively). The other three social referents - Extension Officers (Mean = 2.91, SD = 1.694); important neighbouring farmers (Mean = 2.39, SD = 1.406) and Opinion Leaders (Mean = 2.05, SD = 1.203) - were reported by respondents to be weak social referents. Consequently, their associations with producers' intentions,

although significant and positive, were also weak.

4. DISCUSSION

Cocoa producers' intentions to continue adopting fermentation technology was confirmed in this study. This somewhat fermentation intention is indicative that in the long run, the quality of produce from Ghana will continue to be high. The results also confirms other empirical findings that the TPB's constructs of attitude and subjective norms as well as past behaviour are significant predictors of agricultural producers' fermentation intentions [12]. Producers have a generally positive attitude towards recommended fermentation technologies. This finding is supported by earlier studies on cocoa producers [12, 20]. However, as suggested by Baah and Garforth [19], it is clear that Ghanaian cocoa producers' attitudes are not always positive. Negative attitudes that block strong fermentation intention formation are associated with the lack of direct financial rewards. This could be due to the fact that the cocoa market in Ghana pays the same price per unit to all producers regardless of their quality grades [27].

Positive attitudes relate to ease of applying recommended technologies and beliefs that there are non-financial rewards. Producers did not find fermentation impractical or overly time consuming. Batz et al [32] argue that characteristics of technologies influence their adoption. Recommended fermentation technologies have the characteristic of being simple and require low external input usage. Another explanation for producers' belief that fermentation technology is practical and not time-consuming is experience. Fermenting cocoa for 6-7 days with two turnings has been recommended to producers over a long period of time [2]. Following this recommendation may have become routinized for farmers. As shown with past behaviour variable, the more producers adopt the fermentation technology, the stronger their intentions. Still on positive attitudes, the lack of direct financial rewards notwithstanding, the belief that there are non-financial rewards associated with supplying quality cocoa is significant. This finding lends credence to the governments' policy of providing several non-financial incentives (mass-spraying, scholarships, free seedlings, free fertilizers, housing etc) to all producers as a means of motivating high performance [33].

The influence of society on producers' fermentation intentions arise from the historical political role cocoa has played in shaping Ghanaian societies [34]. Due to the importance of the crop in employment, fiscal performance, balance of trade, community mobilization, and village economic booms, cocoa producers have come to see themselves as not only working for sustenance but also responsible to the nation.

Purchasing clerks are another significant social referents. Purchasing clerks are the first and perhaps the

most regular cocoa market chain actor that producers interact with. Although the literature mentions that their relationship is not always smooth, the evidence in this study points to their influence on producers' intentions [18]. The positive association of Purchasing Clerks with producers' fermentation intentions may be explained by the legal and financial power the buyers have in the cocoa market. This power arises from the rules set by Ghana's cocoa marketing board that purchasing clerks must buy only quality produce. Additionally, when governments make certain policies (like payment of bonuses to producers), purchasing clerks tend to be the agents they use to reach producers.

As shown by the results, Chief Farmers are a relevant referent who influence producers' fermentation decisions. The Chief Farmers are an interesting and influential group in the cocoa industry of Ghana. The village Chief Farmers' influence arise from being important sources of information as well as acting as agents for implementation of certain government policies (mass spraying reference) [35]. The title of a Chief Cocoa Farmer is often unanimously conferred an influential person by members of the farming community. He represents the village at district meetings. At the district, he votes for a District Chief Farmer; who in turn votes for a Regional Chief Farmer. The Regional Chief Farmers form the leadership of the Ghana Cocoa Coffee Sheanut Farmers Association (GCCSFA). This is the recognized association that negotiates with the government on behalf of all cocoa producers.

4.1 CONCLUSION

Policy makers have always been concerned with how to motivate cocoa producers to sustain and further improve on Ghana's cocoa bean quality. This study shows that a critical area policy makers need to look if they are to successfully get producers to sustain the supply of quality cocoa beans is their fermentation intentions. To continuously keep fermentation intentions high, attitudes need to be influenced, and also certain influential members of society can be drafted to shape producer intentions.

A number of recommendations are suggested to keep producers' fermentation intention high. First, it is recommended that government takes steps to ensure that these incentive policies are fairly and equitably distributed among Ghanaian cocoa producers. This recommendation is based on the evidence that incentive policies are associated with positive attitudes and high intentions. Secondly, policy makers need to consciously continue put cocoa in the public discussion, as it serves to put positive pressure on producers' fermentation intentions. Thirdly, the government already uses Purchasing Clerks to implement a number of policy decisions. This relationship between the government, buyers and producers needs strengthening. A good place to start is to make polices that improve the level of trust between producers and Purchasing Clerks. Finally, given the importance of Chief Farmers in influenc-

ing producers' fermentation intentions, further research is needed into the best mechanisms which can be employed to support the GCCSFA to be a much more grassroots organization.

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