IOSR Journal of Economics and Finance (IOSR-JEF)
e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 9, Issue 6 Ver. III (Nov. – Dec.2018), PP 01-05
www.iosrjournals.org

Extensive Tobacco Cultivation in Kushtia District of Bangladesh: Changes in Cultivators' Perception Regarding External Cost

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Abstract: *This paper aims at exploring whether tobacco growers receive positive marginal social benefit than the marginal social cost they incur from extensive tobacco cultivation in rural areas of Bangladesh. This study uses primary data collected randomly from 185 tobacco producing families of the study area. Each family is evaluated as a tobacco growing unit. There are few areas of Bangladesh where tobacco is grown in a large scale, among these areas Kushtia is one of the renowned regions. The main purpose of this study is to find whether the farmers actually get benefited by growing tobacco. The study employs Analysis of Variance (ANOVA) model to receive the expected outcome. Besides, both quantitative and qualitative analysis are used to compare Marginal Social Benefit (MSB) and Marginal Social Cost (MSC) of the tobacco growers. The findings from the study reveal that though the tobacco growers have some incentives of growing tobacco by a huge margin the total production process assumes a considerable amount of external cost such as environmental protection cost, loss of fertility of the soil and healthcare cost. Apart from this, the results also show that one of the main factors that affects the overall production level of tobacco is untimely precipitation. Additionally, farmers become discouraged if they are not provided with flexible loan facilities to produce tobacco from tobacco manufacturing companies.*

Keywords: *Tobacco Growers, ANOVA, Marginal Social Benefit (MSB), Marginal Social Cost (MSC), Untimely Precipitation and Loan Facilities.*

Date of Submission: 08-12-2018 Date of acceptance: 23-12-2018

I. Introduction

In Bangladesh, tobacco is generally grown in lands which were previously used for cultivating other agricultural products. Tobacco cultivation in Bangladesh has been mainly encouraged by a number of multinational companies operating in the country. Bangladesh is considered as one of the top ranked tobacco producing and consuming countries of the world whereas employment in tobacco production accounts for .5% of the total employment in agricultural sector of the country [1]. Both the consumption and production of tobacco is injurious to health, around 5.5 million people die prematurely per year due to excessive consumption of tobacco which is the second major cause of death globally [2]. Larger amount of land is required to produce a huge amount of tobacco though the farmers become encouraged by a number factors like ready cash, short-run profit, high demand of tobacco, advanced seed and fertilizer facilities, and provision of loan for producing tobacco by the multinational companies. On the other hand, tobacco production has some negative connotations like loss of fertility of the land, polluting the environment and related health hazards of the people associated with the production of tobacco. A study found that 50% of the paddy fields has been replaced by the production of tobacco while approximately 62% of the farmers associated with tobacco production suffer from coughing and asthmatic diseases [3]. Though the analysis of cost and benefit still remains untouched. Low and middle income countries are highly inclined to be affected negatively by tobacco production as it is found that almost 70% of the tobacco-attributable diseases occur in low and middle income countries of this planet [4]. Another study revealed that soil degradation is central to the disadvantages of the extensive tobacco production because almost all of the tobacco manufacturing companies assess the quality of the tobacco produced in terms the quality of tobacco leaves. As a result, the remaining parts of the body of tobacco plants degrade the fertility of soil because it lacks the necessary biomass required to feed back the soil [5]. Tobacco production in Bangladesh started becoming popular during mid-sixties of last century and it increased dramatically after the country became independent in 1971 [6]. A number of studies also confirmed that tobacco production is positively correlated to not only soil degradation and environmental pollution but also to deforestation in a bigger margin. Consequently, the land used for dwelling purposes and for producing foods are declining alarmingly. Loss of biodiversity and food sources, agrochemical pollutions and cutting down trees for tobacco production lead to the baffling of the most important ecosystem which in turn affect human health negatively [7]. Some studies corroborated the fact that tobacco cultivation has increased in developing countries whereas it has decreased

significantly in developed countries as they have been concerned about the environment and health aspects of tobacco production. Data represent that, over the time span of 30 years in United States on America, tobacco output has dropped significantly by 12% or more while Japan with the same level of time period has experienced around 50% reduction in growing tobacco [8].

It is also found that maternal smoking and Exposure to Tobacco Smoking (ETS) can generate some deadly diseases and some injurious health related problems. In United Kingdom (UK), on an average 13% children have exposure to smoking tobacco and nearly 36% of mothers are smokers which lead to a lower infant adjusted mean birth weight by 36 grams while pregnant women who are tobacco smokers experience premature childbirth [9]. Another study conducted in United States of America (USA) revealed that maternal smoking during pregnancy and childhood exposure towards tobacco smoking can cause asthma and wheezing and the result is statistically significant [10]. Tobacco production process can enormously pollute air which in turn affect indoor environment negatively. As a result, most of the people living on that particular area suffer from allergic diseases and are always in a risk of adverse health effects due to chronic exposure to indoor air pollutants [11]. Most of the respiratory diseases arise from exposure to tobacco smoking or the environment polluted by tobacco production or consumption. Children of all ages can be attacked by the problems related breathing and lung function decrement though exact effects can differ across different age groups [12]. Study has also been directed to determine the differences between cognitive abilities of the children who are exposed to high level of tobacco-attributable pollution and who are less-exposed to tobacco. Results represented that there is a significant negative relationship between exposure to tobacco and cognitive abilities, those who have relatively high exposure show lower level of cognitive abilities [13].

All the aforementioned areas regarding the negative impacts of tobacco production and consumption have been explored though the effects of tobacco work on women and children through exposure to nicotine, pesticides and its relationship with mental health demand further researches especially in developing countries where most of the tobacco growers solely bank on tobacco production for their livelihood [14]. Further studies have been conducted to pinpoint the impact of mainstream tobacco cultivation on immune system. Results showed that exposure to tobacco can have negative effect on immune system and lead to slight immu-nostimulation and antibody production can be suppressed [15]. Furthermore, there is a considerable amount of external cost regarding tobacco production such as the health effects of non-producers and the family members of non-producers. Waste production due to individual consumption as well as tobacco manufacturing process induces a huge environmental damage which in turn raises the cost of environmental protection. In this case, the cost is deemed as external cost [16].

II. Methodology

This study uses primary data collected from 7 tobacco producing villages of Kushtia district in Bangladesh. Data have been collected with the help of structured questionnaire which is formulated after extensive review of existing literature and from practical experiences. Each tobacco producing family has been considered as a production unit from which data have been collected through personal interview. A total of 185 families or production units were interviewed for collecting data. So, the sample size of the study is 185 consisting of tobacco cultivators having different number of production cards from tobacco manufacturing companies. Analysis of Variance (ANOVA), inferential and descriptive statistics are used to find the expected outcome. Additionally, the concepts of Marginal Social Benefit (MSB) and Marginal Social Cost (MSC) have been introduced to discover what farmers actually understand about the comparison between external benefit and marginal cost.

MSB=MPB+MEB……. (1)
In the above equation,
MSB= Marginal Social Benefit
MPB= Marginal Private Benefit
MEB= Marginal External Benefit

MSC=MPC+MEC…… (2)
In the above equation,
MSC= Marginal Social Cost
MPC= Marginal Private Cost
MEC= Marginal External Cost

Tobacco cultivators should increase production of tobacco as long as ***MSB>MSC*** (Marginal Social Benefit is greater than Marginal Social Cost). Moreover, they should reduce production if opposite happens that

means ***MSB<MSC*** (Marginal Social Benefit is less than Marginal Social Cost). They should not have any incentive to change the level of production that means they remain indifferent if ***MSB=MSC*** (Marginal Social Benefit is equal to Marginal Social Cost).

III. Results and Discussion

[A] Variation in Card Holding among Respondents:

From Table 1 below, it can be easily seen that there is a variation in the number of card holding among the producers. Higher number of cards holding indicates higher quantity of land cultivated by that particular production unit (a family in this study). As can be seen from the following table almost 40% of the farmers have only 1 card while the frequency of card holding decreases as the number of card increases.

Table 1: Variation in Card Holding among Respondents

Numbers of Cards	Numbers of Card Holders (Frequency)	Percentage
1	73	39.46%
2	49	26.49%
3	41	22.16%
4 or More	22	11.90%
Total	**185**	**100%**

[B] Educational Level among Respondents:

Educational is considered as one of the very important factors of awareness. So, before asking for the farmers' perception regarding the adverse effects of tobacco production their educational status should be known. Level of education is expected to be negatively correlated to tobacco production because the higher the education level is, the better should be the knowledge about the negative effects of tobacco production. As can be seen from Table 2, people from all educational level are engaged in tobacco production. Among the respondents approximately 37% people stopped going school before class 5 or never went to school whereas around 24% of them are involved in tobacco production even though they passed the secondary examination. Therefore, higher level of education has some sort of negative association with the engagement in tobacco cultivation.

Table 2: Educational Qualification of Respondents

Level of Education	Frequency	Percentage
Class 5 or Less	67	36.22%
Class 8	31	16.75%
Secondary (SSC)	43	23.24%
Higher Secondary (HSC)	28	15.13%
Honors and Above	16	8.65%
Total	**185**	**100%**

[C] Cultivators' Perception on External Cost and Benefit:

World Health Organization (WHO) report showed that there is a negative association between sound health and tobacco uses either for consumption or production. The scenario is not much different in Bangladesh. There are around 5.4 million people around the world who die an early death due to tobacco uses [2]. Statistics portrayed that nearly 57,000 people in Bangladesh die yearly due to different types of engagements with tobacco cultivation and uses [1]. This study is more concerned with finding the changes in farmers' perception regarding environmental degradation and healthcare cost they incur over the time span of five years (2013-2018). A similar study was conducted to find to discover the cultivators' thinking related to external cost of tobacco production in this area in 2013 [1]. The findings of that study has been compared with the results of this study. As can be observed from Table 3, there has been some radical changes in farmers' perception regarding a number of issues related to tobacco cultivation. First of all, a higher percentage of cultivators now think that continuous tobacco farming can harm the productive power of soil. Furthermore, now, a huge number of farmers believe that tobacco cultivation helps environment gets polluted and bring a number of deadly diseases to the most of the people in the regions where tobacco is grown extensively. Additionally and importantly, a greater percentages of farmers than those of 2013 now believe that tobacco causes a significant amount of increase in their healthcare cost. So, it can be forecasted that people awareness increases by a greater margin regarding external cost. Over and above, tobacco production is extremely fertilizer intensive and sometimes it requires special type of fertilizer. In most of the cases, the manufacturing companies provide advanced loan, seeds and fertilizer facilities to the farmers. But, now, approximately 51% cultivators think that companies' advanced loan facility is not feasible. In fine, it can be inferred from the data that, farmers are gradually being discouraged to go for tobacco production and they are being more conscious about the adverse effects of tobacco cultivation.

Table 3: Changes in Cultivators' Perception

Opinions of the Respondents	2013		2018	
	YES	NO	YES	NO
Does tobacco cultivation reduces soil fertility?	66.4%	33.6%	81.9%	18.1%
Is the production process responsible for air/environmental pollution?	62.2%	37.8%	76.3%	23.7%
Is tobacco farming detrimental to health?	75.2%	24.8%	92.5%	7.5%
Does tobacco manufacturing companies provide the farmers with feasible loan facilities?	61.5%	38.5%	49.8%	50.2%
Is production of tobacco is fertilizer intensive?	66.8%	38.2%	70.6%	29.4%
Total data used	**262**		**185**	

[D] Results of Multiple Regression Model:

The Regression Model for this study looks like: $Y= \beta_1 + \beta_2X_1 + \beta_3X_2 + \beta_4X_3 + \beta_5X_4 + \beta_6X_5 + \beta_7X_6 + \mu$

In the above model,

Y=Benefit of Tobacco Production, β_1*= Constant,* X_1*= Number of Tobacco Cards a cultivator has,* X_2*= Cost of Seeds and Fertilizers,* X_3*= Cost of labor and irrigation,* X_4*= Cost of Processing,* X_5*=Total Output,* X_6*= Price and* μ*= Stochastic Disturbance Term.*

Table 4: Results of Multiple Regression Model

Variables	Coefficients	Standard Error	't' Value	Level of Significance
Constant	1052.573	2312.279	.401	.691
X_1	834.523	125.873	5.791	.001
X_2	2.649	1.031	6.913	.040
X_3	2.942	.326	9.463	.000
X_4	2.012	.423	8.482	.003
X_5	3.956	.847	4.916	.030
X_6	1.150	.469	2.890	.030

As can be seen from the table above, all of the variables of the regression model have been statistically significant at 5% level of significance. As a result, the benefit of extensive tobacco cultivation has been predicted well by the econometric model mentioned above. Furthermore, Table 6 summarizes the model and represents some important indicators to adjudge the fit of the model. To begin with, data used to estimate the model showed good fit. The value of R^2 has been .895 which means around 90 percent variation in dependent variable has been explained by the explanatory variables suggesting a strong fit of the data. Besides, the value of F indicates that the econometric model used is fitted well.

Table 6: Model Summary

R Square	Adjusted R Square	Standard Error	F Value	P value
.895	.913	4783.739	3954.392	.000

Most importantly, cultivators have understood that they have a considerable amount of external cost of production though there are some incentives behind extensive tobacco cultivation. Having considered the environmental and healthcare aspects of the tobacco cultivation, most of the farmers are being discouraged in cultivating tobacco. Tobacco manufacturing companies do provides the farmers with advanced loan facilities but farmers have realized that they have a very strict policies of the repayment of the loan. Apart from this, as farmers cultivate only tobacco, with the income earned from tobacco cultivation is used for healthcare purposes and purchasing food items. So, it can be said that they have a very small amount of incentive or external benefit which tends to be zero but a huge amount of external cost to be incurred.

Recommendations

From the aforementioned discussion, some recommendations can be formulated to reduce the external cost which means to reduce the negative impacts of extensive tobacco cultivation on environment and health status of the cultivators. If followed, the following recommendations can largely help cultivators to receive positive external benefit rather than external cost.

1. The price of the tobacco for a particular season should be determined by the appropriate authorities considering the interest of the cultivators so that they remain protected from loss. A minimum price level can be set for a particular year in condition to be revised when necessary.
2. Supply of advanced seeds, fertilizers and provision of loan should be made flexible. Save tobacco manufacturing companies, government banks and NBFIs (Non-Bank Financial Institutions) should provide loans to the tobacco growers in easy terms.

3. Awareness should be raised by numerous campaigns both from government authorities and different private organizations relating the negative impacts of tobacco on environment and health status.
4. There should be some stringent rules and regulations and implementation of those rules should be ensured so that everyone cares about environmental degradation.
5. Cultivators should be equipped with appropriate training facilities to make them understand regarding fertility loss, environmental pollutions and causes of a number of fatal diseases. As a result, they will be more concerned about the environment they live and the diseases they encounter.

IV. Conclusion

To conclude, it can be easily said that though cultivators have some positive incentives to cultivate tobacco, most of the tobacco growers now understand the adverse effects of tobacco cultivation on environment and health. The quantity produced is decreasing as the comparison of quantities produced in different years suggests. This paper finds tobacco cultivation has some serious negative impacts on environment and health care leading to a huge amount of external cost to the farmers. More specifically, not only the tobacco growers but also the family members of them and non-tobacco growers of that region are being affected negatively. Apart from these, external cost also includes the fuel cost that is required for the processing of tobacco leaves before selling it to manufacturing companies. Consequently, trees are cut down randomly leading to deforestation and environmental imbalance. Use of different types of fertilizers degrades the fertility of the soil whereas the processing of tobacco leaves through burning pollutes the air and makes the environment unhealthy. In fine, concerted efforts from both public and private agencies should be directed to fight the situation and make this planet a better living place.

Acknowledgements

Author shows his heartfelt gratitude to Md. Jewel Al Mamun, a final year student of Department of Economics at University of Barisal for his kind help while collecting data from the study area. As Md. Jewel Al Mamun is from Kushtia, Bangladesh (study area) and a son of tobacco growing farmer, his help was priceless and much appreciated.

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Md. Tanvir Ahmed1,. "Extensive Tobacco Cultivation in Kushtia District of Bangladesh: Changes in Cultivators' Perception Regarding External Cost." IOSR Journal of Economics and Finance (IOSR-JEF) , vol. 9, no. 6, 2018, pp. 01-05.