Sunk Cost Fallacy: Effect of Situational Knowledge on Irrational Choices

P. Balasubramanian
Associate Professor, Amrita School of Business, Amrita University, Coimbatore, India

K. Kalyanasundaram
Ph.D. Research Scholar, Amrita School of Business, Amrita University, Coimbatore, India

Aravindhan S
Student, Amrita School of Business, Amrita University, Coimbatore, India

Abstract

Sunk cost fallacy or escalation of commitment is one of the cognitive biases referred as the characteristic of people justifying more investment because of the prior investment. Since the costs are beyond recovery, whether an action taken or not is irrelevant to the decision. Application of this theory in the field of agriculture is very unique and this paper aims to establish the irrational choices adopted by the farmers in selecting a crop. We selected a region in the southern part of India where coconut is the main crop. We were interested in understanding the reason behind the farmers continuing with cultivation of coconut trees with the depletion of water table in the region. Two experiments were conducted one with the students and another with farmers to understand a) effect of situational knowledge on the choice of crop, b) difference between farmers and highly educated professionals in their decision on the choice of the crop with respect to a specific situational knowledge and c) difference between the "Coconut cultivating" farmers and the "Other crop cultivating" farmers on the reason for obsession with coconut farming. First experiment was a random and controlled experiment conducted with 128 students of a School of Business. It was a 2^2 experiment with two factors viz. visual effect and awareness on cost-benefit at two levels. The aim was to understand the impact of visual photographs and awareness on cost benefit of dying coconut trees on their decision to choose alternative crop or status quo. Results prove that there is a significant relationship between visual effect and the decision on the selection of crop in spite of clear knowledge on the cost –benefit. The second experiment was conducted with a randomly chosen 40 farmers from the region. They were asked to decide on the crop hypothetically on the basis of the situation of depleting water table. The experiments prove that irrationality in choices is more exhibited when people are already committed with investment in line with the theory of sunk cost fallacy.

1. Background to the Research

In India, agriculture contributes to around 13.7% of the total GDP and 50% of the total workforce is involved in agriculture.The states of Kerala, Tamil Nadu, Karnataka, Puducherry, Andhra Pradesh, Goa, Maharashtra, Odisha, West Bengal and the islands of Lakshadweep and Andaman and Nicobar are the major contributors to coconut cultivation. Almost 92% of the total production in the country is accounted by the four southern states namely, Kerala (45%), Tamil Nadu (27%), Karnataka (11%), and Andhra Pradesh (9%). The farmers choose crops depending upon the topography, weather and the economic benefits. On our visit to some of the places in the region, we found large coconut farms with some of the farms bearing dried coconut trees. We also observed a few farmers in the same region growing other crops. We were quite familiar with the region and have knowledge on the availability of ground water especially having seen monsoon failures. Our interest was to understand the reason for obsession with coconut farming in spite of having opportunities to cultivate other crops.

2. **Importance of this Research Problem**

Most of the farmers' invest on a bore well for saving the coconut trees inspite of depleting water table.There is always some amount of hope and confidence though there were visible failures of non-availability of water. The puzzle we had in our mind was the farmers have knowledge on the failure of bore wells in the region from their neighbours, community and society. There are also viable alternate crops in the region with less water requirement, in turn less investment but why itwas very difficult for the farmers to seek other alternate crop. We set out ourselves with the task of investigating this phenomenon in the region with an initial qualitative study with about 15 farmers using snowballing sampling approach through our contacts. The results intrigued us to further investigate the reasons in depth.

The sad part of the story is farmers take loans to invest in the bore wells with high interest rate. The stakes are high not only for the farmer but the entire family. In India, suicide of the farmers is in the rise recently due to the financial crisis with failure to get the profits due to various reasons with a burden of huge loans.This made us more interested in the topic and explore further with an in-depth study. Our scope of study is only limited to examining the reasons for the obsession with the coconut cultivation.

3. **Literature Background**

Knetsch (2004) refers to the difference in the explanations of behaviour observed in daily life and experiments with the standard theories of various economic researchers and specifically indicates the expanded usefulness of economics. Kwang (2003) refers to the narrow view adopted by many economists and stresses the importance of studying behavioral patterns more towards irrationality than rationality. This provides a basic framework for us to take a wide diverse view of various rational and irrational economic theories and its unique application to real life situations.

Escalation of commitment theory can be adopted and explained across various functions and domains of the industry. Tsai & Young (2010) studied the effect of human emotions on the escalation of commitment. They conducted two experiments to prove that anger as an emotion has more influence than fear on the escalation of commitment. Their second experiment was conducted examining the influence on the financial decision making. So, the results from both the study indicated that not every negative emotion alleviates escalation of commitment. Nevertheless, emotion plays a big role in decision making and applicable across cultures especially in India.

Claxton (2008) argued the importance of uncertainties in decision-making by organisation. Obviously when dealing with uncertainties it is difficult to gather enough information from all sources to decide on the alternatives. In our experiment, the farmers have a thorough knowledge on the water scarcity in the region by not only observing the neighbours and the surrounding community but also from their own experience. We met a few farmers who had invested huge sums of money in digging bore wells several times in the last two decades, still hoping to save the coconut trees. In the case of experiment with students, the situational knowledge and the uncertainties surrounding coconut cultivation was explained.

Stroughet et al (2008) experimented to find the influence of age groups (older and young groups) on sunk cost fallacy. They studied the students group and the old-dwellers in the community mainly investigating their cognitive abilities. They found that older groups are less likely to commit sunk-cost fallacy. Though our experiment's main objective was not to find the effect of age on sunk-cost fallacy, naturally the groups of students and farmers fit into two different age groups.

At an organization level, there are theories that explain the reasons for the managers to continue with a project in spite of the knowledge of failure in

due course. This applies to governments and policy makers as well. Buxton and Rivers (2014) experimented on the escalation of commitment studying three factors namely the presence of an alternative investment, high magnitude of loss – the loss they would incur if the project is continued and the monitoring of the situation. The results showed that the combination of presence of an alternative investment and the loss magnitude had major effect on the decision and no significant effect was found for monitoring the situation.

Fox & Staw (1979) argued that psychologically people tend to justify their decisions due to self –esteem and especially when faced with an external threat or evaluation. Tetlock and Boettger (1994) indicated that a "status quo effect" is common and very much acceptable while evaluating decisions mainly due to the perception of individuals as 'principled', 'accountable' and 'decisive'. The farmers though uneducated traditionally have been perceived as principled and accountable by the society by the virtue of their status and welfare-orientation towards the surrounding villages. The tendency to resist the change in decision is high in a situation where the decision maker increases the need for justification.

Steinkühler et. al (2014) studied the various factors relating to escalation of commitment and took a view on motivational perspective in conceptualizing the "need for self-justification" through cognitive approach. Their empirical tests proved that the self-justification indirectly influences escalation of commitment through selective perception, sunk cost effect and over-optimism. Irrationality, with respect to sunk costs, is explained by various researchers through two psychological mechanisms namely self – justification and loss aversion. However, Friedman et. al (2007) also indicated the rational parts such as "maintaining the reputation" and "continuing project may offset loss".

Staw& Fox (1977) conducted an empirical study to examine the effect of personal responsibility, efficacy of resources and time on the commitment of resources to a course of action. They found that personal responsibility and efficacy of resources though had effects in the short term but not stable over a period of time and had interaction effect on the escalation of commitment.

Ting (2011) argued that the persistence on the chosen course of action resulting in escalation of commitment could be an effect of the proximity to the goal rather than sunk costs. The experiment controlled the sunk cost effect and studied the influence of "goal- gradient" with a perceived value difference resulting in high escalation of commitment. This effect was observed in many of the farmers while investing on a bore well. When the expectation of water availability is at around 500 feet and eventually failed, they tend to be more optimistic to drill further inspite of knowing the costs involved in line with the goal-gradient theory.

Huning and Thomson (2013) studied the impact of attributions to escalation of commitment. They found that individuals who attribute "personally placed responsibility" as a reason for failure tend to display more escalation of commitment rather than those attributing other causes. The optimism in them with emphasis on personal control of the situation over the environment helps them in their effort to continue in their endeavor.

4. Research Questions

We Wanted To Study the reasons for the obsession with coconut cultivation in the region though there is an opportunity to choose alternate crops with both the farming community and educated professionals. The key research questions were as follows:

1. Does the knowledge on a specific situation with respect to cost benefit influence the decision on the crop?

2. Is there a difference between farmers and educated professionals in their decision on the

choice of the crop with respect to a specific situational knowledge?

3. Is there a difference between the "Coconut cultivating" farmers and the "Other crop cultivating" farmers on the reason for obsession with coconut farming?

5. Experiment 1:

We did an initial qualitative study with 15 farmers in the region for us to get a better understanding of the situation and reasons behind the choices of the crop. Then we conducted a random and controlled experiment with visual effect as independent variable at two levels i.e. with and without visual effect. The dependent variable is the decision on the crop (coconut or alternative crop).

128 students from a School of Business were involved in the experiment as subjects. The students were split into two groups randomly with the first group of 63 students provided with a detailed cost-benefit analysis and the second group of 65 students not provided with any information on cost benefit. The first group was split further randomly with only one group shown visuals of dying coconut trees to induce the emotion. The scenario was stimulated by setting the contextwith an introduction of the experiment tothe students posed as farmers. The scene was set with an explanation to assume the subjects are from the farming family and have been cultivating coconut trees, the main crop of the region, for generations in one acre of land.

The specific situation was simulatedby providing information on the scarcity of water,resulting in 40% of the coconut trees dying in turn leading to a loss situation. Two choices were provided to the participants with one decision beingcontinuation with the coconut cultivation even after drought and another choice to destroy the trees and seek viable alternative crops of the region. To induce the effect of emotion, a visual scenario was created using two photographs taken from the region, with one showing a series of healthy green coconut trees and another one showing the brown dried coconut trees.

6. Design of experiment - I:

	With awareness on cost - benefit	Without awareness on cost – benefit
With visual effect	Group 1	Group 3
Without visual effect	Group 2	Group 4

7. Analysis:

The results of the experiment were analyzed using Minitab and tabulated below. Since the data is a count data and binary in nature, chi-square was chosen as a statistical technique.

Chi-Square Test for Association: Visual effect, Decision on crop (with awareness on cost-benefit analysis)

	Coconut	Alternative crop	All
With visual effect	17 12.70	15 19.30	32
Without visual effect	8 12.30	23 18.70	31
All	25	38	63

Cell Contents: Count
Expected count

Pearson Chi-Square = 4.910, DF = 1, **P-Value = 0.027**
Likelihood Ratio Chi-Square = 4.995, DF = 1, **P-Value = 0.025**

Chi-Square Test for Association: Visual effect, Decision on crop (without awareness on cost-benefit analysis)

	Coconut	Alternative crop	All
With visual effect	21 20.92	13 13.08	34
Without visual effect	19 19.08	12 11.92	31
All	40	25	65

Cell Contents: Count
Expected count

Pearson Chi-Square = 0.002, DF = 1, **P-Value = 0.969**
Likelihood Ratio Chi-Square = 0.002, DF = 1, **P-Value = 0.969**

8. Results of Experiment - I:

At 5% level of significance, from the output from Minitab (p=0.027), it proves that with awareness on cost – benefit analysis, there is a significant association between visual effect and the decision

on the selection of crop. However, without a detailed awareness on cost – benefit, (p= 0.969) there is no significant association between visual effect and the decision on the crop.

It is clear with the visual effect of dying coconut trees, the participants were emotionally connected and would want to save them especially with the commitment (investment) made already on the existing coconut trees. As against an expected count of 12, 17 participants opted for coconut trees with visual impact indicating irrationality in their choice. In the scenario of non-availability of cost-benefit analysis, though there is statistically no association between visual effect and the decision on the selection of crop, more number of participants would want to save coconut trees irrespective of the visual effect, probably because of the simulated sentimental attachment of growing coconut for generations which is in line with the theory observed with the farmers during our initial study and later confirmed by the second experiment.

9. Experiment – II:

From our initial qualitative study and the experiment, we were able to establish the irrationality in choices made by the educated participants. While the first experiment helped us understand the choices of the students posed as farmers, we wanted to understand if there is a difference in the decision between coconut cultivating and non-coconut cultivating farmers in the real life situation. 40 farmers were randomly selected across the region out of which 20 were cultivating coconut as the main crop and another 20 cultivating other crops in the same region. They were asked a question on the choice of continuation of coconut trees or choosing an alternate crop. For those "non-coconut cultivating" farmers, they were asked to assume a situation of having coconut farm and decide on the basis of the situation. Many of these farmers have done a large amount of investment in the form of bore wells for water. The result of this study given below:

	Decision	
	Coconut	Alternative crop
Coconut farmers	20	0
Alternative crop farmers	16	4

10. Results of Experiment - II:

Since the farmers are actually experiencing the sight of dying coconut trees every day, visual effect does not have any significant relationship with decision and was irrelevant as well. Type of farmer does not have any relationship with decision on alternative crop. For the amount of time and effort spent (5 to 20 years) the effect of loss due to the situation after having spent money also irrelevant.18 farmers went for bore well multiple times ranging 2 to 14 bore wells in the last 5 to 10 years. There is a strong sentimental value attached to the coconut trees. All the coconut cultivating farmers did not even consider changing to other crops while there were 4 farmers from the other "non-coconut cultivating" farmers who would consider switching over to alternate crop, a choice of rationality probably because of their bad experience.

11. Conclusion and Recommendation for further research:

The farmers of this region have been cultivating coconut trees for many generations. Typically, a coconut tree starts yielding its benefit from 5 to 8 years since the initial plantation. Coconut forms the core part of the people and their lifestyle, finding use in many ways apart from the commercial use. They are emotionally attached to the trees since the trees and its produce for man integral part of the family and tradition. There is also a rational belief in the region that the coconut trees would help them in their livelihood in the long run with minimal labor and effort. As we see the dwindling joint family tradition in the rural parts of India, a few farmers reminded us of a proverb in local language which quotes"Coconut trees feed us: whereas our children don't support us during

older age". Irrespective of the knowledge on the cost benefit, the farmers want to save the trees and continue do farming rather than choosing viable alternate crops which is an amazing display of irrational choice influenced by their emotions. The study also indicates there is no difference in the decision irrespective of someone is educated (learnt cost benefit analysis as part of their curriculum) or not. However, we find that all the "coconut cultivating" farmers tend to escalate their commitment due to emotions, though a very few "alternate crop cultivating "farmers are rational in their choices.

Though our experiments are restricted to one geography, it can be extended to other regions of the world. It can be studied if there is cross- cultural dimension resulting in cognitive biases and in turn influencing the choices of selection of a crop. We took an eclectical approach in our research to apply the concept of cognitive bias in the field of agriculture which makes this study very unique, more interesting and importantly practical.

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