Identifying the factors affecting the adoption of Low Carbon Agriculture Policy in Brazil

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Abstract: Aiming for the mitigation of greenhouse gas emissions and to promote sustainable agriculture, the Brazilian government launched a National Plan for Low Carbon Emission in Agriculture (the ABC plan) in 2010. Most of researches showed the results of ABC plan are still in great uncertainty, due to lack of an authorized measure tool. Thus, this paper addresses the Brazilian ABC plan, trying to identify the factors affecting the implementation of the low carbon emission in Brazilian agriculture and to look for some potential inspirations for the future policy. Based on literature review approach, a total of 23 references were analyzed. The outcomes illustrate the key affecting factors in credit situations, government and policy, and resource utilization and distribution.

1. Introduction

Brazil has one of the highest positions in greenhouse gas emissions (GHGs), and GHGs caused by agriculture activities account for 33.2% of the Brazilian total GHGs [1, 2, 3]. The Brazilian federal government committed to reducing its GHGs in 2009 [4]. In 2010, the Brazilian government launched a National Plan for Low Carbon Emission in Agriculture, the ABC Plan, which encourages sustainable and low-emission agricultural activities though incentivizing farmers to adopt 6 emission-reducing technologies by providing affordable and attractive credit. This plan has a total budget of R$ 3.15 billion (about 1.5 billion US dollars) [5, 6].

Most of the research conducted before 2017 showed that the results of the ABC plan remain unclear, as there was no proper measure tool. In this case, there are few researches digging deeply into the results of ABC plan. In June 2019, the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA) published a document that elaborated the adoption situations and mitigation results of six technologies promoted by the ABC plan [7]. It is worthy of note that, for the 6 mitigation technologies, the most recent report on the effectiveness of the plan shows that 4 out of 6 technologies have already exceeded the commitment targets for 2020 (see in table 1), both in terms of values of mitigation and the expansion of the area. In terms of the rest 2 technologies, Recovery of Degraded Pasture (RPD) and Planted commercial Forests (FP), both of which remained far below the target levels [8, 9].

Table 1. Targets, potentials, actual adoptions and emissions of six technology of the ABC Plan

Targets	Potential Mitigation of CO_2 eq (million Mg)	Adoption situations (million hectares/m^3)	Mitigation of CO_2 eq (million Mg)
Recover 15 million hectares of degraded pastures (RPD)	83-104	10.44 (2017)	39.57
Increase 4 million hectares of Crop-Livestock-Forest Integration Systems (ILPF)	18-22	5.83 (2016)	36.40
Expand 8 million hectares of the No-Tillage System (SPD)	16-20	12.72 (2017)	23.28
Expand 5.5 million hectares of Biological Nitrogen Fixation (BNF)	10	10.64 (2018)	19.47
Expand 3 million hectares of Planted commercial Forests (FP)	10	1.44 (2018)	1.19
Treatment of 4.4 million m^3 of animal waste (TDA)	6.9	4.51 (2018)	7.04
Total	143.9-172.9	-	126.95

Source：Elaborated by author based on MAPA, Observatório ABC and Souza, G. et al. [8,9,10].

The main objective of this paper is to analyze the reasons behind the huge gap between the ABC targets and the reality in Brazil. This paper is conducted using the literature review method based on Google Scholar, and keywords are as follows: "Brazil" or "Brazilian" and "ABC plan" or "National Plan for Low Carbon Emission in Agriculture" and. Only recently the result of the ABC plan has become less unclear, in this case, the search is mainly limited to those studies after 2017. Finally, 14 research are yielded.

2. Results and affecting factors of abc plan

Regarding the environmental impacts of these technologies, preliminary estimates published by MAPA suggest the mitigation of values between 100.21 and 154.39 million tons of CO, eq from 2010 to 2018 [7]. Data until 2018 showed that there is still a distance to the overall commitment for 2020. As regard to one of two below standard technologies, the RPD technology is considered to have the greatest mitigation potential among all six ABC technologies [8], for which the mitigated values would still be around 40 million tons of CO2 equivalent (eq.), compared to the commitment of 83-104 million (See in table 1), and approximately 21.5% of pastures in Brazil were degraded by 2018[11].

The main body is structured from three perspectives about factors that affect the adoption of ABC technologies: 1) Credit situation. 2) Government and policy. 3) Resource utilization and distribution.

2.1 Credit Situations

In terms of credit situations, the OBSERVATORIO ABC initially estimate that approximately R $ 152.3 billion was required to meet all the ABC plan targets, through the ABC program (a financial program), but the actual financial support amounts from 2013 to 2019 were only 9.5% of the original estimate, which was R $ 14.4 billion [12]. Although the RPD has the highest credit demand among all six ABC technologies, which was more than 40% of the total fund of the ABC program [9, 13], it is still far below its established targets.

Besides, in the first 5 years from the implementation year of 2010/2011, the number of contracts approved by the plan showed healthy growth, from U$ 1.7 million between 2010 to 2011 to US$ 251 million between 2011 to 2012. After that, the figure dropped by 57% in the year 2015/a2016 and kept decreasing until 2018, the most recent data point. The average contracted value kept the same fluctuation as the number of contracts, which showed a decreasing trend after 2015. Both indicated

that fewer rural producers had access to the funding resources [14]. According to Roberta Souza Piao et al., this could be explained by the changes in the interest rates of the ABC credit lines [15].

In addition, the interest rates of the credit change from year to year, according to the economic situation of the period. The ABC's interest rates fluctuated between 4.5% to 5.5% from 2010 to 2015, but showed a dramatically increasing by 3% to average of 7.5% to 8.5% from 2015 to 2017 [16]. Moreover, there were other credit lines which offered lower interest rates, and the increase in interest rates caused the rural producers tended to these lines. The overall increasing trend in interest rates associated with an economic situation of low growth, both negatively impacted farmers to borrow money from the ABC program [17]. This situation indicated that the ABC Program had been losing ground over time, both from the perspective of the access for rural producers, and from the perspective of the federal government's motivation to stimulate it. Besides, Leal finds that there is a low correlation between ABC loans and the area of degraded pastures, which means that the credits are not being consumed by those producers in states of greatest potentials for emission reduction [17]. Thus, tools for Interest rate adjustment are also needed and it is necessary to improve technologically.

2.2 Government and Policy

In terms of government and policy, among all difficulties, the bureaucratic difficulty is notable when acquiring ABC contracts, for instance, 1) there are many administrative processes when applying for credit support, one of the examples is that the analysis of the georeferenced project of the property and soil is necessary to obtain the funding. 2) it is required for farmers who want to access the ABC program that they must register in a database of rural property boundaries, the Rural Environmental Registry, but plenty of farmers are not registered. Meanwhile, other rural credit lines are simpler and faster, which is more attractive than those of the ABC program [16,18,19]. According to Assad, abandoning some requirements and improving the monitoring of ABC environmental objectives is an effective measure in favor of greater agility and bureaucratization of the process of contracting the ABC Program operations, it guarantees the correct framing of projects that are financed by the line [20].

In addition, there are deficiencies in the definition of the concept and criteria for the establishment of priority regions in the ABC plan, although the current main focus of the policy is the recovery of degraded pastures [21]. This is also showed in the gap between what Brazil has achieved now and its targets. According to Gianetti and Giovani, it is possible to identify regions of low productivity, especially in livestock (degraded pastures and in poor conditions), as priorities of the ABC Plan [18], and the main indicator for this characterization is that the rate of stocking of animals per hectare below 0.7 [19]. Besides, according to another report from Observatório ABC, there would be an annual economic cost of approximately R$ 3.70 per inhabitant if investments were made in the priority areas, while, if free allocation was allowed, there would be a gain of R$ 41.18. However, there would be better positive indirect effects on natural resources and the environment if priority areas are preferred. This economic relationship exemplifies the difficulties of the ABC Program in precisely reaching the areas with the greatest GHG mitigation potential [18, 22].

Moreover, there was a fragility of technical training regarding technologies of ABC plan in the design and implementation stages, which had a negative impact on the disbursement of the ABC Program, both of them would reduce rural producers' motivation to access the loan, and there are two main problems: 1) rural producers lack the knowledge for the preparation of technical projects required by the ABC Program regulations. 2) another challenge for the ABC Program is to involve the improvement of the rural producers' understanding that the implementation of low-carbon agriculture projects generates not only environmental gains but also economic returns. In August 2014, after identifying bottlenecks in the disbursement processes of the ABC Program, a Cooperation Agreement was signed, which generated an initiative called Capacity ABC, aiming to release the resources of the ABC Program in a faster and more efficient way. The Capacity ABC program seeks to provide technical training to designers and financial agents in relation to the techniques recommended in the ABC Plan and Program. However, the complicated political environment in the country and successive structural and executive changes caused capacity ABC to be stopped momentarily in 2016 [11].

2.3 Resource Utilization and Distribution

It is worth noting that the most important resource of the plan is funding, but the distributions of funding should not only target preferential credit lines, other actions are also needed to be stressed, including technical assistance, human resources training and information, the adoption of Technological Reference Units (TRU), monitoring actions, public solicitations for adopting Technical Assistance and Rural Extension Services (RES) [15].

In terms of resource utilization, a significant challenge is that only a low level of currently available resources was utilized. In this case, the Observatório ABC identified the shortcomings of the ABC Plan and Program, and then carried out a review proposal trying to improve the rate of resource utilization including several structural actions, dissemination and training, institution and governance reform, implementation of the monitoring system, improving transparency. One of these proposals is also stressed the need to prioritize resources according to the GHG mitigation potential [18, 23].

In terms of resource distributions, there are also indications of differentiation in the allocation of resources between regions, states, and municipalities [19]. the North region had gained the most participation in the number of ABC contracts. This was mainly because that the North region was the focus of the dissemination and training of the ABC techniques for rural producers in the region. However, the concentration of ABC program resources was in the Midwest and Southeast regions throughout the whole plan period, due to the presence of a more branched technical assisted network in these two regions, as a consequence, there were greater interest and demand for resources. This also indicates the importance of promoting technical training and dissemination actions.

Another reason contributing to the imbalance of resource distributions was that there was a lack of dialogue between state climate change policies and ABC. Among 25 states, only 6 of them had climate-change plans which encouraged good agricultural practices as a mitigation strategy [15].

3. Conclusion

There are few researches about the result of the ABC plan due to the lack of authoritative measure tool until recently. In June 2020, MAPA published a document that elaborated the adoption situations and mitigation results of six technologies promoted by the ABC plan, in which there was a considerable gap between the targets of the ABC plan and the actual implementations, especially in RPD technology. In this case, this research uses literature review to investigate some factors that affect the adoptions of actions prompted by the ABC plan.

For credit situations, the current borrowing is much lower than initial estimates, one of the reasons is the overall rise of the interest rate. Another reason is that Funds are not flowing to the areas with the highest mitigation potential. For government and policy, bureaucratic difficulties, deficiencies in the definition of priority regions and technical training are stressed. Both of the above indicates the imbalance in the utilization and distribution of the ABC resources.

It is worth noting that three perspectives of factors affecting the ABC plan are not separated. As the main resource of the plan is funded from the ABC program, in this case, the low rate of utilization and differentiation of distributions mainly related to funds, and the latter mainly caused by the imbalanced dissemination and training network among regions, which requires more advanced policies to motivated people.

One main limitation of this study was there are no proper tools to measure the actual economic and environmental impacts of each factor mentioned. In consideration of the overall estimates about the result of ABC plan has become clear only recently, I suggest future study conducting in-depth quantitative researches to measure the precise impacts of each factor.

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