

Deconstructing a biofuel hype : the stories of jatropha projects in South Sulawesi, Indonesia

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Deconstructing a Biofuel Hype

The Stories of Jatropha Projects in South Sulawesi, Indonesia

Keywords

Jatropha Curcas, *jarak pagar*, biofuel, biodiesel, hype, non-market drivers, Indonesia, South Sulawesi, Indonesia

Jatropha Curcas is a perennial succulent shrub native to Central America. In Indonesia, jatropha is popularly known as Jarak Pagar. The name jatropha comes from the Greek iatros, meaning doctor, and thrope, meaning food, which alludes its applications in traditional and folk medicines. Aside from its medicinal applications, all parts of the crop have some beneficial applications for humans and/or animals. Jatropha is used by farmers for boundary hedges, or to protect crops from browsing animals. Jatropha plants grown from seedlings are effective in reducing soil erosion. Jatropha oil can be used directly as a fuel for lamps and stoves. The technology is very simple, however for its use as biodiesel it needs a modified engine or blending with fossil diesel fuel or transesterification to jatropha methyl ester or jatropha biodiesel. Under the concept of the bio-based economy, the non-fuel applications of jatropha for other valuable products are explored, such as the production of high-value cattle feed from the press-cake residue of jatropha oil extraction by detoxifying the material. Jatropha can also be used to produce a soap that has very high anti-bacterial qualities. Finally, all waste parts (press seed cake, fruit husk, seed shell) generated by the oil extraction process can be used for biogas production or as source of organic fertilizer.

In the early of 2000s, jatropha emerged as a popular focus of both research and investment in biofuels sector. At that time, jatropha was introduced worldwide as a 'wonder crop' for the claim that it is a low maintenance crop suitable to most climatic and soil conditions with an ability to withstand drought. The promotors of jatropha had framed the potential benefits of the plant in terms of environment, energy security, and rural development. Jatropha was described as an energy plant that can lead to energy independence, alleviate rural poverty and make use of marginal land not suitable for food production. In various reports, jatropha was praised as a wonder crop and farmers, biofuel producers, consumers, and the environment would all benefit from growing and processing jatropha.

In 2006, the Government of Indonesia issued the national biofuels' development blueprint, which provided a promising future for biofuels sector in the country. This blueprint set up a very ambitious plan to replace up to ten percent of the national fossil

fuel consumption with biofuels by 2010 and also to create employment for 3.5 million people by the same year on 5.25 million hectares of unused land. Further, this blueprint was used as a basis to issue various supporting regulations and policies to boost the development of this sector with specific focuses on the provision of incentives and market guarantee. In the blueprint and the subsequent regulations, specific attention was given to *jatropha curcas* as the most preferable biofuel option. Jatropha was endorsed by the government as the most suitable plant for biofuel production not only for the product itself but also for the claim that it could contribute to wasteland rehabilitation and income generation in marginal areas. During its hype years, it was estimated that there were hundreds of jatropha investment projects in Indonesia. They consisted of investments and projects by various actors: governments, universities, state-owned enterprises, private sector, and NGOs; and covered various types of projects: nurseries, plantations, oil productions, equipment and machineries (e.g. pressing machines and stoves), as well as the production of other jatropha-based products.

However, despite the existence of a great deal of optimism and supporting regulations, the biofuels sector faced a serious downfall. The downfall of jatropha was caused by a combination of market pull (blending targets, subsidies, land allocation, and incentives to investors) and technology push factors (plant breeding, oil processing and value adding) that were not sufficiently well prepared or developed, and implemented within the framework and guidelines necessary for a realistic commercial development. Essentially these factors were either absent or weakly implemented and there were many mismatches in timing and aligning of push and pull factors. Combined with the lack of any long-term commitment or legal framework to protect industry participants, the confidence in jatropha eroded.

This research took place in South Sulawesi in order to investigate the implementation of jatropha projects in the period of 2006-2011. This research aims to understand the key factors that were influential in the rise and fall of jatropha projects. The existence of various jatropha projects in South Sulawesi in those years has raised a question on why jatropha as an entirely new sector with no established players, an untested product and market, and unproven business plans was able to become a hype in South Sulawesi. It is noted that while jatropha in specific was promoted and prioritized as a crop suitable for marginal areas, the findings in my research show that jatropha had been introduced into the commercial agricultural setting of South Sulawesi at a significant scale through various projects in the period of 2006-2011. This research also presents an analysis about the failure of the projects to understand what opportunities and benefits that were pursued by the involved actors and how the achievements of the opportunities and benefits redefined the failure of the projects.

The analysis of jatropha promotion in Indonesia was started with the examination of the national context of jatropha promotion in order to understand why and how jatropha received heightened attention and support from various actors. For this national level analysis, I examined the background of the jatropha hype and the roles of key actors during the hype period: governments, scientists, state-owned companies, private

investors, NGOs and farmers, by focusing on their backgrounds, activities and results. This dissertation has shown that the jatropha development in Indonesia was to a very large extent built on spectacular positive claims and promises. The hype was created and maintained by the key actors to influence policies and to create various opportunities around jatropha other than the production of the biofuel itself.

Despite the positive objectives behind the promotion of jatropha, it has been evident that most of the research claims were premature and not yet supported by scientific evidence for a successful empirical implementation. The promotion of jatropha outpaced both the development of the market for end products, and more fundamentally, the evolution and spread of knowledge that might have helped to fulfill some of its potential. In the last decade, in a wave of enthusiasm for the plant, the hype won out over common agronomic sense, and both myth and capital were quickly dissipated as the plant struggled in hostile growing environments. There was a serious disconnection between the laboratory assumptions made by the technical scientists on the one hand and the social and economic realities on the other hand. The absence of knowledge had created conditions of uncertainty. Inaccurate or wrong information was widely spread and this resulted in negative impacts both for the investors and the farmers.

One of the crucial gaps was the historical aspect of the plant. There has been a misleading claim on the history of jatropha. While a substantial number of people in Indonesia retained a collective memory that was associated the term of jarak pagar with the Japanese occupation, very few Indonesians actually have clear knowledge about the plant. The limited knowledge on the true history of jatropha has caused farmers to fall easily into the trap of overwhelming promises and claims on the jatropha potentials at the time of the hype. In Chapter 2, I specifically focused on the reconstruction of the actual history of the cultivation and the use of jatropha in Indonesia. I conclude that there was no record available to support the claims that jatropha had been widely cultivated and applied as biodiesel during the Japanese occupation. All references that I used as my source of verification clearly indicate that it was castor, and not jatropha, that was cultivated under the mandatory instruction of the Japanese colonial administration. The examination also found that the cultivation of castor in that period was aimed at addressing the shortage of fossil based lubricant and not as diesel fuel replacement in the war period. This finding explains why there is so little knowledge among farmers about the cultivation technique and the actual yield result that can be expected from the plant. The limited knowledge has contributed to the failure of jatropha. There was little knowledge on the best agricultural practices, such as spacing, pruning, and the correlation between fertilization of trees and yields.

The study further shows the important role of the biofuel scientist groups in the jatropha hype creation in Indonesia. The scientists, especially those from the biofuels research groups in ITB played a central role in the creation of the idea of jatropha as a miracle energy crop and in the translation of global discourses on jatropha to national and local levels, mediating the jatropha hype circulation between scientists from international level down to the local research labs, bridging the hype to policy makers and business

institutions, and providing access to production factors on the ground for investors. Meanwhile, the government became the locomotive for the other actors in the national scale implementation of jatropha projects via the issuance of the biofuels development blueprint and its supporting policies and regulations, the allocation of budgets for the government's led jatropha projects in various formats, the provision of market guarantees through the role of the state-owned companies, and the issuance of biofuel consumption mandates to be met by the private companies.

In the analysis on the actor networks in this thesis, I explained that the social networks of the actors played an important role in providing intermediary services for them to have access to capital, grants and budget allocations as well as to access key production factors such as the technology, land and labor. Each project exhibits the personal network of the key actors from where they gained access to capital or funding as well access to human resources, technologies and land. They utilized their social networks to provide them with intermediary services to access various resources upwards and downwards. Many of the actors were able to access budgets for their projects by influencing policy makers through their networks, such as the jatropha related research projects in the local universities, and the CSR projects.

The pre-existing networks as well as the connectedness to key individuals were the key advantages for most of the projects to access the desired resources. Those with limited networks had to rely mostly on the official channels to access resources. The results difference between the two can be significant, because it is more likely that those who are well connected to political, financial and/or social power, have better chances to achieve their associated objectives. However, the existence of political connections and influences for a venture itself is also proven not to be a solid guarantee of success. The story of PT JOP, which was owned by the Bakrie Group, a politically influential business group and operated by the locally influential Halid family, is an example of this case. The combination of the business objectives and the political interests in the operations of the venture failed to go hand in hand.

In my description on the twelve projects, I found that the overall motivation for the emergence of these projects in South Sulawesi was driven by the high expectations of jatropha, and the availability of a large amount of funding from investors, companies and governments for these projects. However, the incomplete value chain for jatropha in South Sulawesi (as also happened elsewhere) with very little processing of jatropha oil and no clear marketing of end products taking place, had caused a strong pursuance of non-oil objectives in these projects.

The availability of funding, such as the CSR itself, research grants, and government budget allocation for jatropha related activities had become another key driver of many of the observed projects. These non-oil drivers had attracted actors, such as government officials, university researchers, the private sector, and NGOs to implement various jatropha projects and they apparently perceived them as end goals of their interests in jatropha instead of the production of biofuel itself. Both drivers attracted various actors, including

those who had no experience in agribusiness but decided to promote jatropha for commercial investments even with very limited knowledge about the plant. They spotted relevant opportunities for them to benefit and contributed to shaping the enabling environment for their own interests. This is a condition that generated opportunistic behavior, as they designed their activities to match to the conditions of the funding with further implications on the unsustainability of the projects after the available funding expired.

The opportunistic behavior of the actors and the short life of the projects were closely related to how the actors defined and perceived the jatropha projects in which they were involved. The analysis of these factors indicates that the term 'project' in the twelve jatropha projects had been widely understood in the way Indonesians in general define *proyek*, a specific connotation of 'easy money'. Focusing on this specific connotation helps to explain why little attention has been paid to fostering a market for jatropha, why there has been so little long-term financing of jatropha projects, why the opportunistic behaviors of the actors were considered as 'a common sense' and why the short life of the projects was 'easily accepted'.

The research also points out that for the observed jatropha investment projects, while there were high expectations on jatropha, the reality that jatropha was not yet a commercially proven crop made actors very cautious about getting involved. Formal project proposals mentioned well-established business models for collaboration between companies and farmers, such as 'nucleus-plasma', land-leasing agreements and joint ventures. However, in the implementation of the projects, activities were predominantly guided by the informal common understanding between the project actors that their cooperation was just a *proyek* or a pilot project, emphasizing its short-term and trial nature. This understanding therefore minimized the expectations of the actors, limiting them to the benefits they had gained during the implementation of the project' had been understood as a type of business model for testing jatropha on the ground, and was instrumental for actors, such as companies or research institutes to test jatropha in field settings in a way that transferred the costs and risks to others, especially to the farmers.

The common understanding of the short-term and trial nature of the project made it easier for the actors, including the project partners (especially the farmers and workers), to accept and agree upon the sudden termination of the projects for a variety of reasons, including the absence of a market, the end of subsidies and the lack of additional funding. This was explicitly demonstrated by most actors who played roles as project initiators, operators and managers. Their involvement in the jatropha projects was dominantly driven by the strong pursuance of non-oil objectives, such as land lease income, employment and agro-inputs provision. They perceived these objectives as their end goals to get involved in the projects instead of in the production of biofuel itself. Therefore, those who managed to find specific opportunities to benefit within their projects would not perceive the failure as their loss. This *proyek* mentality is an unpleasant reality faced by many development initiatives, including jatropha development, and can be seen as a cause of its failure. The short-term and trial nature of the observed projects also explains why there was no fundamental change in the agrarian structures in the projects' locations. Despite the existence of land allocation for jatropha in the locations where the observed projects were operating, the crop conversion was only temporary, relatively small-scale and there was no long-term land transfer.

In my actors' analysis on the patron-client pattern in relation to the role of middlemen or brokers in the supply chain of jatropha and cassava, I found that the role of the traditional patronage system still remained influential for the success of a venture to access farmers and their resources in South Sulawesi. The case of jatropha and cassava in Moncongloe, in Chapter 6, shows how JOP adopted exclusively a non-commercial patronage system, consisting mostly of local elites, in intermediating their relationship with plasma farmers. On the other hand, cassava companies used the intermediary services of the village collectors who supplied them through the open market system and who were significantly influential in motivating farmers to cultivate cassava.

The results of each strategy, appeared to be very different. The story of JOP shows the chaotic implementation of their plasma scheme for their full reliance on the mediation of village elites. In the story of the cassava company, EN3 also experienced a disappointing result when they relied on the support of the elites reflecting the fragility of reliance on elites. On the other hand, the partnership with village collectors has proven to be more effective. Their relation was purely commercial, where village collectors were engaged using attractive prices and incentives for cassava that they delivered. Attractive prices and incentives, in turn motivated collectors to deliver positive information and to invest by providing loans to their farmers to improve their production, both in terms of quantity and quality as desired by the company.

In analyzing the intermediary role of patrons, I distinguish the intermediary patrons into two types: commercial and non-commercial intermediaries. Commercial intermediaries are those with reliability and competence in commercial activities and linked to their constituents through related commercial activities, such as village level collectors/ middlemen and senior farmers. Non-commercial intermediaries, on the other hand, are those who have no previous experience in relevant commercial activities but they have social and political influence on their constituents. They are usually people who have worked either in development projects (proyek), in NGOs, or in election committees in the villages. These were the previous experiences that they could use as a base for building a network. The perception over personal quality of a patron built on the traditional and religious values as well as the social and economic dependency of clients, became the key foundation for farmers' loyalty and trust towards the patron figures. This explains why the modern patronage system which is characterized by less feudal forms, which are more impersonal, rational, less dependent and non-permanent, as represented by the political actors, government officials, and NGOs, can be ineffective to ensure the loyalty of farmers in places where traditional patron-client system is still prominent. Against this background, I argue that the intermediary analysis in explaining why certain investments fail or why they are successful is crucially important, not only because it can serve as a

complementary element to the conventional supply chain analysis, but also because it reveals many other aspects that are often underexposed in the conventional analysis, especially aspects related to the local culture and politics.

With regard to the discussion on land, the village level analysis has also demonstrated that the introduction of a new crop was significantly influenced by the status of land tenure and land use practices. The case of Moncongloe has shown that there was rapid land selling that affected the availability of land for farmers to cultivate. While farmers were still allowed to use the plots of land that they have sold for farming activities but they already had limited freedom in deciding on the types of crop to cultivate on that land and also in committing to certain business models. Land use and tenure analysis are interrelated with the business models analysis. The selection of land to be incorporated in jatropha investments was influenced by the type of land use and tenure, which determined the feasibility and accessibility of land by the investors under the adopted business model. In the case of Moncongloe, the rise of land prices had made farmers to be very concerned about their land rights and very cautious in entering any legal commitment with other parties that could affect the security of their land rights, including in joining and committing to a business model, such as the outgrower scheme that required a long-term commitment and involved unforeseen consequences for their land rights.

Lastly, as the aim of this research is to study and to gain valuable insights from the past experience of jatropha for the future improvement of the biofuels development, we can conclude that successful domestication and commercialization of new crops will require a long-term process and will demand a long-term commitment by all key actors. Sufficient resources should be devoted towards research trials both for the plant and biofuel as well as the co-products development technologies. A clear link with the market should be established where market involvement in the whole process from research and development up to the marketing should be encouraged. More importantly, coherent and consistent biofuels development policy instruments should be in place.