

# Ford's Obsession to Rubber

## An Empirical Study about Irrational Decision Making

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### Abstract

In the middle of the 1920s Henry Ford made an investment decision seeming rather rational at that time. He wanted to be the first man owning a large scale rubber plantation in the Western hemisphere giving him self-sufficient access to the rubber necessary to produce tires for his cars. Thus he financed an experiment in the Amazon jungle. Within a short period however, market conditions had changed dramatically and the on-site-situation in Brazil was all but satisfying. Nevertheless he carried on for more than a decade without any recognisable repayment on his investment. Even the shortage of rubber during World War II did not help the plantation. Finally, the project was not given up before December 1945, when all circumstances had changed dramatically. Hence, although rather unusual in that way, the paper may be considered as a contribution to experimental economics as well as behavioural economics, because it is about an (agricultural) experiment as well as about the behaviour of a industrial tycoon.

**Key Words:** economic history, Ford Motor Company, rubber, plantations, Brazil, investment decision, rationality, irrationality

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## Introduction

This paper is about an experiment as well as about behaviour, thus it may be considered as a contribution to experimental economics as well as behavioural economics. Nevertheless, it is an unusual one. Neither was the experiment carried out in a laboratory (in the strict sense of the term), nor is it a theoretical paper, but it is a piece of economic history (and in that sense an empirical study) about an investment decision connected to various sometimes more, sometimes less rational factors of influence. At the same time it was an entrepreneurial experiment, one of the most prominent attempts to establish a rubber plantation in the Western hemisphere, and about the behaviour of the man responsible for that decision, Henry Ford, one of the most successful and influential businessmen of the early twentieth century.

As it is usually a good idea especially in economic history, I want to tell a story and to draw some lessons out of this story instead of arguing along formulas and statistics. In short, this story is about an outstanding personality trying to win supremacy over nature by constructing trees as well as a whole city in the middle of the jungle, trying to create civilized men out of “savages”, and also trying to produce his own rubber for tires and other parts to equip his cars. With this venture, Ford failed almost completely, and in retrospective it is easy to argue that this result was clear from the very beginning. Although this becomes less clear from the contemporary viewpoint, the decisions – the original, but even more the decision to carry on in the 1930s – were very much confused by influences of something an ordinary economist would refer to as “irrational” behaviour, something obviously not negligible neither in everyday life nor in economics.

Literature about Fordlândia in particular is relatively scarce. Usually there is only scattered information in several books about the Ford Motor Company or its head, about Brazil, about tropical rainforests, or about rubber in general, many of which do not mention the project at all. Thus more detailed information can be found in books about rubber (Davis 1996, Dean 1987, Weinstein 1983) or Henry Ford (Bryan 1997, Nevins and Hill 1957). The number of scientific articles about Fordlândia is even scarcer (Galey 1979, Russell 1942, see also Esch 2003 and Sedrez 2000). Hence also some popular sources become interesting, like a novel (Sguiglia 2000), TV documentaries (like Tschirner 2002), magazine articles (like Dempsey 1996) or even comic books. This paper thus is also dedicated to overcome this negligence, at least a little.

It is organized in four parts: the first one deals with the question how the experiment was started by describing its circumstances, putting special emphasis on the rationality behind the original decision based on some assumptions that proved almost immediately to be wrong; the second part describes the various problems challenging the project more closely, confronting some still rational motives for carrying on with some more or less irrational ones; the third part then tells some details about the end of the experiment, while a fourth part, suggesting lessons and conclusions closes the paper.

## How to Start an Experiment

### *The History of the Project*

Besides some preliminary explorations and investigations, Ford started his venture in Brazil in 1927 by founding a company (the “Companhia Ford Industrial do Brazil”) in Belem, the capital of the state of Para. This company had three main purposes: to plant (and possibly manufacture) rubber, to utilize by-products (like timber or electricity), and also to construct hospitals, schools, and other buildings and infrastructure to improve the local living conditions (FMCR Acc. 301, Box 1, particularly Article 10 of the “Articles of Association”). The plantation was located at the shores of the Tapajoz River, a tributary to the lower Amazon, and 2.5 million acres (i.e. 10,000 km<sup>2</sup>) of land were granted by the provincial government (in connection with excessive tax relieves for material used to “produce and process rubber”). In September 1928 Ford started clearing at the place soon becoming known as “Fordlândia”, immediately followed by planting. The natural conditions at the concession, looking quite promising on first site, soon proved to be all but favorable for a rubber plantation. Problems of mismanagement, planting failures, labor unrest, governmental interventions, cultural misunderstandings, and possibly most important an environmental disaster challenged the venture very seriously.

These problems were encountered and some could be overcome after some years, particularly the relationship to the native workers improved by better adaptations to local customs and to the local environment. This was also favored by a change of location, but nevertheless leaf diseases and other pests became endemic within a short period at both places. Thus millions of trees never really came into production due to early deaths and no or low yields. But at both places, Ford not only planted rubber trees. He also constructed and staffed hospitals and schools; he built a lot of buildings and infrastructure; he built churches and recreational facilities and secured access to affordable food and fresh water for his workers and their families; he built a saw-mill to exploit lumber and a powerhouse to secure electricity; and he also experimented with a lot of by-products. Employment topped at more than 3,000 people as early as 1930 (mainly for construction), slightly more than again in 1942 (then mainly for planting and maintenance). Thus, Brazilian officials considered the plantation a fabulous example of development of “the North”, especially because of its medical standards. But according to production, it was a complete failure, producing hardly any rubber and hence paying almost nothing back on the investment. This contrasted sharply to various efforts throughout the years supporting production by acquiring expertise, by researching and by developing special techniques of tree-breeding. Consequently, in December 1945, the plantations were sold to the Brazilian state.

### *A Rationalization of the Start-up-Decision*

After the introduction of the assembly line in 1913, Henry Ford became the by far most important car producer of the world. In 1914 as well as in 1921 more than half of the world production of cars was of the Ford model-T-type, which accounted for 37 per cent of all cars running on the planet in 1925 (IRSG 1996:44-51, Nevins and Hill 1963:478-9). These 11 million cars needed – at least – four tires each that also had to be renewed regularly. In the 1920s, the only source of raw material to manufacture these tires was natural rubber. Furthermore, tires were not the only part of the car that was produced from rubber. Hence, Ford needed tires (which he usually bought from his friend, Harvey Firestone, or another tire producer) as well as dried rubber (which he usually had to buy from the British or Dutch plantations in South East Asia). For both, a secure supply of rubber and thus its world market price were essential.

In the early 1920s this situation was rather unusual within the Ford Motor Company (see for more details Bryan 1997, Ford 1923 and 1926, or Nevins and Hill 1957). For some years Ford followed an overall strategy of complete vertical integration and for that end acquired sources of raw materials (timber, iron, coal), bought and built infrastructure (a railway, a small fleet, waterpower-plants), and constructed factories to produce various intermediates for his cars (like glass, wooden parts, metal parts). His goal was the all-in-one-factory, where at the one end all raw materials (out of own sources) were transported into (by own means) and at the other end the finished car came out. Strangely, rubber and tires were absent in his collection even in the mid-1920s.

This was not a big problem in the world rubber market of the 1910s. Although Ford's demand for rubber increased steadily as his production figures of cars increased, rubber prices decreased due to the explosion of production owed to the introduction of plantations in Asia. Before that, the best yielding rubber was endemic to the Amazon region and the Congo basin and thus Brazil was the most important country of production (by gathering). In the heydays of the rubber boom, a ton of rubber sold in 1910 at 964.5 pound sterling in London (yearly average). In the same year, some 80,000 tons were produced worldwide, half of that in Brazil, only a tenth at plantations in South East Asia (the rest distributed mainly between Peru, Bolivia and the Congo). Due to the success of the plantations, production was expanded to more than 400,000 tons in 1919 and prices had fallen by 76 per cent within a decade. This development continued and in 1922 rubber prices experienced a historical low (until then) of 85.5 pound sterling (IRSG 1996).

This situation provoked a reaction by the world's biggest supplier, the British Empire. In the same year, the British enforced the so called Stevenson-Plan. This scheme allowed controlling the production of rubber according to world market prices. In fact, although the Dutch never really participated, it was a cartel, uniting for some years three fourths of world production. During these years, the cartel proved to be rather successful: prices almost doubled in 1923, and finally rose to 322.1 pound sterling in 1925, while world production nevertheless increased, but at much lower pace (IRSG 1996). Clearly, the

world's biggest consumer of rubber now also had to re-react: the United States, consuming approximately three fourths of total production. The immediate reaction came from tire tycoon Harvey Firestone, anxious of a tremendous price rally. He initiated a conference of important rubber using industrials and officials early in 1923, and – also owing to his lobbying – the government then sponsored expeditions to search for alternative rubber sources in Latin America in 1923 and 1924 (Dean 1987:67-72). Firestone later turned to Liberia to establish his own rubber plantation there, Ford turned to Brazil.

These attempts could not have an immediate effect, because rubber plantations need at least seven to ten years before coming into production, and also the gathering of wild rubber could by no way be increased to the amounts necessary to satisfy U.S. demand. Thus, in the mid-1920s, fears were very real: fears of an ongoing increase in prices as well as of a general shortage of rubber at the world market. The effect especially on Ford, then producing more than two million cars each year, and his policy of continuing price cuts to improve his market share (followed for more than a decade before), would have been very clear: extra charges for tires would by far surpass any cut of the price of the car itself.

### *A Rationalization of the Choice of Location*

Nevertheless, although Ford was contacted by Brazilian officials as early as in 1923, he did not really carry out any plans before 1926, when a small expedition was sent to Brazil to investigate possible sites there. But why was it sent to Brazil? And why did it – within Brazil – concentrate on the Tapajoz River?

The answer on the first question is relatively easy. Particularly three points spoke for Brazil: first, Brazil is the motherland of rubber, the home of *Hevea Brasiliensis*, the best yielding variety of the rubber tree with respect to latex, the basis of rubber (this is also the variety used for plantation in Asia); secondly, Brazil is part of the Western hemisphere and the distance to the United States is much less than from East Asia (at the same time, the natural conditions are much better than in Central America or the Caribbean, which would have been even closer to the United States); thirdly, the cultural difference between the United States and Brazil was regarded to be much less problematic than in the case of an investment in Africa, which would have been equally interesting with regard to natural conditions and geographical distance.

The next question is not so easy to answer, but reports about the explorations of 1926 (see LaRue 1927 and 1953) provide some evidence. The main reason thus seems to be a combination of two arguments: first, the upper Amazon was ruled out by the Company (as well as all small rivers) because of bad transportation, although the best rubber land was located there; secondly, of the riversides at the lower Amazon, located mainly in the province of Para, the Tapajoz was considered as superior compared to any alternatives for reasons of accessibility, climate (particularly sufficient rainfall) and soil quality along the river. Generally, compared to the average rubber plantation areas in the East, the conditions and the costs (in combination with a proposed higher degree of mechanisation)

were estimated to be much more favourable. One question remains: Why that particular place, later causing a lot of foreseeable problems? Besides insufficient preliminary work also corruption seemed to have played a role. The interests of local businessmen and even the governor of Para were, often carried out very personally, not without any influence on the decision.

*Seems to be a good idea, isn't it?*

Besides unexpected costs for “bribes”, the installation of a plantation in Brazil at the place only known as “Boa Vista” (“good view”) before Ford’s engagement was a bargain and thus seemed to be a good idea. The region was close to the United States (three weeks by ship) and also politically part of the Western hemisphere. The place seemed to be easily accessible by ocean-going ships. The soil was very good and sufficient rainfall was observed, also some big and old rubber trees (as well as a lot of smaller ones, as well ready for tapping) could be found there. It also seemed to be rather easy to get seeds and planting material close to the site or from another part of the Amazon basin. Also the history of the world rubber industry proved that the decision to go to Brazil in general and to the Tapajoz in particular could not be wrong. As one problem the scarcity of population and thus of labour was seen. Therefore it seemed to be necessary to construct not only all production sites but also proper housing and city facilities for the workers. But all other difficulties were considered as minor ones.

## How to Get Stuck with an Experiment

*The Macroeconomics*

Ford started his venture in Brazil in 1928, immediately after a serious intra-firm-crisis (changes at the automobile market made a complete restructuring of the Ford Motor Company necessary) and immediately before an even more serious extra-firm-crisis (the Great Depression). While Ford in 1923 reached a production record for 2.2 million vehicles (of which almost 1.9 million were passenger cars), the number dropped due to changes in the preferences of consumers and strong competition to only 550,000 vehicles (380,000 passenger cars) in 1927. Ford decided to adapt to the changing market conditions and – instead of selling the same Model T, all black, every year – built a new model and provided several varieties. The new Model A was very successful and as early as in 1929 Ford produced again more than 1.5 million cars. Then the Great Depression came and hit particularly the automobile industry hard, because the shrinking purchasing power of the consumers was not spent on new cars but goods more essential for everyday life. Ford was no exception; he was hit later, but harder than his competitors: total production in the automobile industry decreased 40 per cent annually from 1930 to 1932, and Ford’s share dropped from more than 41 per cent of total US-production in 1930 to less than 22 in

1933 (in 1932, he produced less than 300,000 cars). All this contributed a lot to the extraordinary unemployment figures in the United States during these years: Ford alone cut employment by more than 70 per cent from 1929 to 1932 (see Nevins and Hill 1957 and for the numbers Nevins and Hill 1963:478-9 and Nevins and Hill 1957:685-7).

For the rubber industry this was an extraordinary demand shock, which contributed a lot to the price disaster during the Great Depression. But this development started even earlier. Although another cartel was started in the late 1920s, prices declined until 1929 again to less than 100 pound sterling per ton of rubber. The second cartel was even less successful than its predecessor. When the Depression further lowered demand, prices reacted catastrophically and dropped to a historical low of 21.2 pound sterling per ton in 1932 (i.e. 7 cents per kilogram of rubber in New York), a price at which plantations could hardly find any profitable market. Furthermore, prices remained low and never topped pre-Depression levels throughout the 1930s. Nevertheless, production volumes improved slightly but constantly (after a setback during the Depression) helping to keep prices low (IRSG 1996).

Ford's plantations charged the Mother Company much higher prices for the results of the first experimental tappings (FMRC Acc. 74, Box 1, folder "Latex shipments"). Under the world rubber market conditions of the 1930s a commercial success of the plantation thus was completely out of question.

### *The Microeconomics*

Hence the macroeconomic conditions were all but favourable for a newly established rubber plantation. But also the microeconomics "on site" had negative influences on the costs and the volume of latex production in Fordlândia. To name just the most important of the problems:

*Site conditions:* the terrain around Boa Vista turned out to be relatively hilly and thus no machinery could be used but terracing was necessary; the river proved to be not navigable for ocean ships for a large part of the year; and also the natural conditions of the jungle environment, although known in advance, made life and work difficult.

*Mismanagement:* following the Ford philosophy of training on the job (and Ford's dislike of "experts"), Einar Oxholm, captain of the ship carrying the original equipment and a man without any experience in rubber (or plantations), consequently became the first manager of Fordlândia (Esch 2003:108); results were disastrous with the effect, that management changed several times, before Archibald Johnston took over in 1931. In 1933 for the first time an expert in rubber planting was hired, but personal conflicts between the leading executives continued to disturb the smooth operation of the venture (see Dean 1987:78-80).

*Problems with local authorities:* the cooperation with the Brazilian authorities was all but easy; customs officers often refused to actually enforce the tax concessions granted (not only because Ford resisted to pay bribes), and there was in general a lot of confusion about federal versus regional competences; a lack of cooperation with the neighboring state of Amazonas also turned out to be problematic and costly (see Dean 1987:73-4).

*Labour problems:* labor turnover was very high at first, amounting to almost 400 per cent annually; in December 1930, even a riot took place among the workers, causing some damages but fortunately no casualties (FMCR Acc. 74, Box 2, folder "Riot of Dec, 1930"); in general, the labor situation was considered to be difficult from the very beginning, because labor has to be acquired far from the plantation; thus the "import" of workers from various regions (within Brazil as well as outside) was often discussed as an option, but never carried out seriously.

*New costs and no revenues:* while the costs of construction, clearing, logging, labour recruiting, and especially planting grew and grew, hardly any revenues could be generated; initially it was calculated that tropical lumber will bear at least a part of the burden of the venture, but in fact no market at all for the harvests from Fordlândia could be found, neither in North America, nor in Brazil, due to high costs (nevertheless resulting from conditions typical for a tropical environment); also the exploitation of oil, metal, or waterpower in the region proved to be impossible or too costly.

*Pest and diseases:* the most important problems throughout the two decades of operation were environmental ones, particularly pests and diseases; leaf blight, root disease, ants, and caterpillars, all contributed a lot to the fact, that only a relatively small number of trees ever came into production; these problems, endemic to the region and seasonally well distributed, hit the plantation continuously and hard; control and treatment, although never fully efficient, added to the already high costs.

### *Thus not so good an idea to stay, is it?*

In 1933, when Fordlândia was hit terribly by a leaf disease, the situation (in retrospect) seemed to be clear: five years of planting was (almost) for nothing, the costs – for construction as well as for production – were much higher than expected in advance, some problems (labour situation) proved to be as serious as expected, but even more (environmental, administrative, technical) proved to be much more serious, and any attempt to utilize by-products failed. The world market price of rubber was extremely low and a strong increase would have been necessary only to cover the costs (not to talk about profits). Also Ford, only slowly recovering from the disaster of the Great Depression, faced much more serious difficulties at home during these days

Two points could possibly be held against this evidence: Ford's idea of an all-in-one-factory was – without a secure rubber supply – simply impossible, thus the context of the venture was broader; and the investment amounted already for \$7 million. Although Ford



himself always had the credo of “never throw good money after bad”, this nevertheless was exactly, what he did for another decade. He did that possibly due to a growing “obsession” to his rubber experiment, but he did that also because he obviously believed to have good reasons for his decision.

### *A Rationalisation of the Stick-to-Decision*

The most important of these reasons possibly is the overall strategy of the Company, reflected in the construction of a tire plant at “The Rouge”, Ford's main factory in Detroit and his experiments with soybeans in Michigan, already in the mid-1930s providing the basis for a lot of parts for his cars. Viewed in this broader context, although the short-term profitability of this “enlarged” venture did not improve much, perspectives for the whole became brighter and in this context the rubber plantation also became less important.<sup>1</sup>

At the plantations two overall production strategies were carried out: reducing costs and improving methods. The first strategy was mainly expressed by a change of location (which at first meant additional costs), when the most remote part of the original concession was exchanged for the equal-sized surroundings of a new site downriver near the mouth of the Tapajoz, where clearing started early in 1934. This place, called “Belterra” (“beautiful land”), was much more appropriate for a plantation, which reduced variable costs. The Company also adapted housing and recreation to the Brazilian way of live, which reduced construction costs and social tension. The original plantation at Fordlândia was not completely abandoned, but reduced to an “experimental” station mainly for tree-breeding.

The second strategy also should contribute to cost-reduction at least in the medium term. By using better methods the rate of success should be improved and thus relative costs reduced. But this was also a strategy for its own ends. James Weir, the already mentioned “expert”, immediately initiated the transfer of seeds from East Asia to Brazil, replacing the domestic ones that (to some degree surprisingly) had proved to be insufficient in quality. The main purpose of this measure was not so much to strengthen the resistance of the trees, but to increase potential yields. Weir also put much more emphasize on research which was not considered as an issue at all before. Hence, emphasize was put on the selection of trees with respect to their performance. By a combination of grafting methods, three sources of an “artificial” tree were put together: a root resistant against root diseases, a high yielding stem, and a foliage resistant against leaf disease. This technique was not cheap (trained labor, experimental gardens, and time were needed), but the results were rather encouraging.

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<sup>1</sup> However, in his quest for tires and rubber parts Ford did not reduce his efforts to improve the rubber plantation in Brazil. The soybean laboratories in Dearborn were at least equally important in that respect. One of Ford's dreams (connected to his concept of “one foot in industry, one foot on the land”) was the idea of a car completely produced out of agrarian resources. He came close to that in the early 1940s, when – experimentally – some cars with plastic bodies made out of soybeans were produced.

Another attempt to improve the performance of the plantations was experimentation with new by-products, which by by-planting also improved the performance of the rubber trees. Several products were tried: cotton, cocoa, coffee, tropical spices, and others. Thus additional revenues could be expected. Also the workers were encouraged to plant their own food in small gardens close to their homes. This reduced the costs for food and also improved the health of the workers and their families.

Another very important issue was the investment in the living conditions in general. One can summarize all these efforts by referring to a missionary spirit of “civilising savages” that from the very beginning on obviously guided the venture (see Esch 2003, also Dempsey 1996).<sup>2</sup> The material content of this mission was the construction and (partly) staffing of schools, hospitals, warehouses, recreation facilities and churches, and generally the transplantation of a North American industrial village with all its comforts (like water supply and electricity) to the Amazon Valley. The Company clearly expected advantages from these measures: although the first (and very Ford-like) idea of “creating consumers” failed, a change in the attitudes of the workers was expected towards a much more “capitalist” perception of life and thus to a much more disciplined work “ethic” than before. The idea was to initiate the desire for even better living conditions among the workers – which could be satisfied through more and better work and thus benefiting Ford. The success of these attempts was rather limited. “Ford was still failing to sustain the workforce it needed. Having succeeded in creating neither a ‘loyal’ nor a ‘disciplined’ workforce, Ford set its eyes on the workforce of the future: children” (Esch 2003:119). However, this strategy was undermined by the sale of the plantations, long before a significant number of children had finished Ford-like education.

In late 1941 another reason provided a strong rationale for the decision not to stop the project (although at that time the environmental problems also had hit Belterra and hope for its future ceased): the United States became involved into World War II. Therefore sources of rubber alternative to South East Asia became strategically if not vitally important, particularly after the conquest of most of the rubber growing areas by the Japanese, which cut the supply for the Free World – the supply of a good crucial for successful warfare, because rubber was needed for almost all military equipment, airplanes, battleships, tanks, and jeeps as well as smaller parts. World rubber production decreased by 60 per cent in 1942 alone, and by 85 per cent altogether until 1945. The bad part of the story for plantations was, that prices were controlled and set to 496 US-dollars in New York from 1942 on (and to 165.3 pound sterling in London) to avoid excessive speculation (IRSG 1996). At that price, only small profits could possibly be earned.

However, the plantations could not utilize this window of opportunity for various reasons. Besides the fact, that the production of synthetic rubber, almost inexistent and inferior in quality before the war, experienced a boom in the United States and elsewhere,

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<sup>2</sup> At least as much as the overall U.S. policy strategy of “good neighbourhood” towards Latin America in the 1920s and 1930s

the production of the plantation itself was absolutely insufficient. All together the output amounted for less than 2,000 tons of latex (not even rubber!) until 1945, most of which came from the “experimental station” at Fordlândia, and not from the actual plantation site at Belterra (FMCR Acc. 74, Box 5, several folders “plantation progress reports” and “monthly reports”). This was negligible even within Brazil, increasing its production from 17,000 tons in 1941 to 30,000 tons in 1944, mainly due to the excessive use of thousands of “rubber soldiers” fighting World War II at the “domestic front”. Hence, the plantation accounted for less than 1 per cent of Brazilian production during the war years, while Brazil, in spite of all favorable circumstances, contributed only 5 per cent to the world production from 1942 to 1945.

### *The Not-so-rationales of the Stick-to-Decision*

This was the more rational part of the story. But there are also a lot of reasons which definitively are much less “rational”. The first point to mention is the importance of the magnitude of the Brazilian venture. According to the closing balance, it accounted for less than one per cent of the overall value of the Ford Motor Company (almost \$1 billion at the end of 1945). Even if the largest estimates of overall investment throughout two decades are taken into account, these amounted for much less (in current value!) than the Ford Motor Company usually earned as net income annually even in the 1910s. In fact, the importance of the rubber plantations even decreased after the outbreak of World War II, which definitively shifted interests completely. Ford, again a great American patriot, dedicated his company completely to war production. The tiny part of the big cooperation in Brazil was in this context almost forgotten. And after Ford had donated his whole tire plant to the Soviet Union (initiated by the US government to help the ally), an own rubber plantation became strange. At least at that point the original idea of complete vertical integration was out of question.

Another personal event strengthened this perception (not to call it negligence): the (formal) president of the Ford Motor Company (and its Brazilian “branch”), Henry’s only son Edsel, died at the age of 49 in 1943, leaving Henry, then almost 80 and previously hit by two strokes, in charge alone. The relationship between the two always was difficult, especially during Edsel’s final years. However, this loss left Henry Ford as an old and lonesome man. Even before, he only had a few contact-persons within the company who he trusted, and he became more and more isolated afterwards. Also his physical ability did not allow concentrating on to many issues and the rubber plantation seemed to be one of the minor ones, at least from 1941 on. Thus the management of the Brazilian venture could act relatively autonomous.

This was especially important in the last days of the plantations. But something, that overshadowed the whole project from the very beginning, was the strong will of this man accompanied to lonesome decision-making. The older Ford became, the more he insisted in decisions once made, one of these the decision to invest in a rubber plantation in Brazil. This became more and more virulent, when at the end of the “era” Henry Ford the

structure of the Company was rather confuse and responsibilities unclear, hence personal relationships and personal strength were important. Thus it seemed to be an important factor, that Archibald Johnston, “overhead” of the plantation from the early 1930s on, and also celebrated as a “grey eminence” of rubber in the 1940s (as such advising the U.S. government), was a strong personality, interested in the fate of “his” venture. He resigned only in summer 1945, after having spent most of his time during the war not in Brazil, but in the United States and thus relatively close to Ford.

Several streams in the personality of Henry Ford definitively contributed a lot to his virtue in standing all tides against rubber as another success story in his personal history. These streams can easily be drawn out of his autobiographical books written during the commercially most successful days of Ford's life (Ford 1923 and 1926). The two most important of these streams for the fate of the rubber plantations are Ford's self-perception as a man almost “doomed” to success, unstoppable and powerful, armed with the certainty of a just mission to create a better world, and the engineer's believe in human supremacy over nature. These attributes had very important consequences for the plantation: if Ford always has success, than the plantation will turn out to be successful, as long as it is carried out really seriously; and if men reins nature, than environmental problems always can be solved technically. Thus, success of the venture is not a question of uncontrollable external factors, but of sufficient investment and sufficient efforts, controllable internal factors. This is an important part of the explanation, why the project was continued for so long without any real chance of repaying on the original investment, not to talk about any profits.

Thus the easy explanation sometimes to be found in the Ford literature, which regards the plantations as one of Ford's expensive “hobbies”, is an exaggeration and too short-cut. To be simply a hobby, it was not only a little too expensive, but also too much a commercial venture. Sure, there are some very eccentric elements in the story, but all that did not overrule the primary focus of the venture on earning revenues, at least in the long run and in a broader context.

Nevertheless, it would not be an exaggeration to call Fordlândia Ford's “utopia”. As Esch puts it: “If Fordlandia became the site for experimentation with Hevea Brasili[ensi]s, Belterra became the site for experimentation with people” (Esch 2003:119). In this context, once again, Ford's self-chosen mission of “civilising savages” has to be mentioned, because the more important part of that mission definitively contributed to the overall development of a society (which is usually not a strictly “rational” end of a business enterprise, even more if foreign based), but not much to commercial ends. The costs of this mission are relatively clear, while profits remain very much unclear. Thus, no proper calculation was possible, neither *ex ante*, nor *ex post*. The entrepreneurial utility of improved nourishment, health, education and purchasing power, particularly in an environment of a poor and very low developed tropical country, is clear, but to secure possible benefits for the Company (not to talk about avoiding free-rides by outsiders) neither the luxury of American style housing, nor the complete industrial facilities, nor the transplantation of a full-fledged village was necessary.

In fact it would have been enough to follow the advice of another expert, who suggested in the mid-1920s that because of the insecurities of the world market, the instability of all possible cartels, and the foreseeable problems in Brazil, the best solution for the company would be to establish some trading posts along the rivers of the Amazon basin to collect wild rubber as long as this is profitable. History proved that this advice was very accurate. But to exemplify the dilemma clearly: this suggestion was obviously something to “insignificant” for a great man like Henry Ford.

## The End of an Experiment

Whatever the reasons may have been, the end of the experiment proved at least, how costly it was. Overall investment is estimated (no accurate numbers exist) to something between \$6 million and \$30 million within twenty years, with possibly \$20 million the best guess. The net loss of the sale alone was calculated at \$7.8 million in 1945, which is almost the book value of the assets (FMCR Acc. 134, Box 4, folder “Assets transferred to Profit and Loss”). The price of the plantations, all inclusive, was only \$250,000, which was the amount Ford owed its workers under Brazilian law as severance pay (Dean 1987:105). Thus, the sale in fact took place at a symbolic price.

Why the venture was finally abandoned after so long time? One point definitely has been that the prospects of natural rubber in general were not considered as bright. Thus the fact that profits could not be earned immediately and the plantation constantly lagged far behind forecasts, made it clear for company officials that the various positive reports about future potentials could not be believed in. Another point connected to that is the argument published by the Ford Motor Company in November 1945 as official reason for the sale: the war experience had convinced Ford that synthetic and not natural rubber has a promising future.

But the same was true a year before. What changed in 1945 (besides the resignation of Johnston), were some big events, changing the circumstances dramatically. At the largest scale, Japan was defeated in August and it was clear, that the South East Asian rubber plantations will return into production within a short period, annihilating all possible shortage-induced profits. At a smaller scale, the Brazilian government was overthrown by a “democratic” revolution in October, which changed the environment for negotiations, relatively favorable before. But the event most crucial for the fate of this particular venture was that in September Henry Ford finally retired (at the age of 82) and handed the Company over to his grandson Henry Ford II. The young man (then only 28 years old) immediately started restructuring and identified as primary targets all ventures not earning money. The rubber plantation was prominent on that list and was sold within three months. In the moment, when strict business considerations finally regained supremacy, there was no chance for a project with a production record that bad than that of Henry Ford's Brazilian rubber plantations, even within his own company.

## Conclusions

So what tells this story? At first, a strictly “rational” analysis of a business decision is absolutely insufficient. Neither the decision to invest at all, not particularly the decision to continue investment for so long, can be explained by a simple cost-benefit-analysis. It is not only very important always to look at the broader context of a venture, to see, on what basis possible costs and benefits are actually calculated, but it is also important to recognise facts usually excluded by economical analysis, like family ties, other personal relationships, hobbies and personal interests of decision-makers, the concrete personal, economical, geographical, or cultural circumstances of a decision, and a lot of other things. The point is not necessarily, that most economic decisions are driven by some “strange” psychological or sociological factors (most may be driven by simple economics). But the point is, not to exclude from an analysis limited to “economic” factors, all possibly predominant factors from another sphere of analysis. Every result able to rule out these influences and then focussing on economical factors is superior to any result not having taken these influences into consideration at all.

In the case of Ford's rubber plantations, an explanation of the “Why?” and the “How” is impossible without recognising influences at very different levels: macroeconomic influences from the world rubber market and from business cycles with all the irrational expectations connected to it; influences from the Company policy and overall strategy, which was not necessarily always dedicated to earning money as its primary end (in fact, Ford always described the main object of his business as “service for the people”); business and thus also political environment in Brazil has to be taken into consideration, which requires the understanding of a distinct business culture and way of life; the natural environment was absolutely crucial for this agricultural experiment; and finally, personal relations and the abilities of the people on site had their impact, often an important one.

Another lesson can be drawn for scholars too much focussing on irrationality in general or on the irrationality in Ford's business strategy (the most extreme thesis in this context are for example, that Ford had no cost calculation or proper accounting at all, or that the “great man” always followed his inspirations to the very end, how oddly they may be) and the confusion of competences and responsibilities in the Company in particular, finally leading to easy explanations about the nature of a venture like Ford's rubber plantations. In fact, Ford usually calculated very carefully (especially the concept of the Five-Dollar-Day is a perfect example for very accurate calculation of cost-efficiency) and he did not easily stick to decisions proving ineffective (as a trained engineer he knew very well about trial and error and how to deal with it). Finally, it may be true that Ford himself and some confidants had superior importance on the decisions carried out, but it is particularly clear that among the most prominent people at Dearborn, rubber had no spokesman at all.

Thus, easy explanations – as it is often the case – fail to hit the target. Any serious investigation of an economic question has to deal with all possible explanations, be it rational or irrational ones, be it easy or difficult ones, and be it economical or other ones.

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