

Developing analytical tools to identify the ‘Fordian model’ in Europe

Michel Freyssenet (CNRS,-CSU, Paris and GERPISA-international network, Evry, France)

TO ANALYSE THE ROLE OF THE FORD MODEL IN EUROPE we need to first accomplish the daunting task of defining the widely used concept of Fordism, an idea whose fate has been similar to that of much other trailblazing thinking. Although it once made possible major qualitative advances in analysis of the development of the auto industry and capitalism, Fordism is now a springboard for all sorts of jumps, and has been distorted to such an extent that no one dares define it anymore, preferring to rely on commonplace notions. Given the success of the concept of Fordism and its ubiquity, and because of all the work that has used it as a starting point, we find ourselves in a position today of having to ascertain the limits of its relevancy – and we should have no compunction about asking whether in fact it has any meaning at all anymore (and if so, how it should be redefined).

Towards this end we first review the main uses that have been made of this concept and show the urgency of eliminating any vagueness and confusion relating to it. We suggest several clarifications to pave the way to a number of distinct notions: intellectual division of labour; national growth mode; profit strategy; and productive model. A recapitulation of the Ford production system's uncertain development (and early crisis) will help us identify the macroeconomic and societal enabling conditions that the system needed to become a productive model. We then offer a more operational definition of a ‘Fordian model’ based on a specific analysis of the operation of the historical Ford system and show to what extent it should be distinguished from the Taylorist and Sloanist models with which it is systematically confused. We conclude by raising further research questions and providing criteria that will allow us to ascertain who has in practice employed a ‘Fordian model’.

1. Does the concept of “Fordism” mean anything anymore?

Ford Motor Company's spectacular performance during the 1910s and the radical novelty of its production system and employment policy were noticed and praised by a host of observers, industrialists, right and left-wing politicians, intellectuals, artists, and union leaders. People thought they were in the presence of a capitalist firm that could offer high wages over the long run whilst lowering the price of something that had been a luxury good, and which would be made accessible to an ever-greater proportion of the general population (as long as people accepted a “rationalisation” of work and a transformation of their lifestyles). Although industrialists preferred to talk about the “Ford system” or “Fordisation”, in the 1920s intellectuals and politicians began to use the expression “Fordism” when referring to “Ford's doctrine”. In the 1930s, certain observers (following the exam-

ple of Antonio Gramsci, philosopher and co-founder of the Italian Communist Party) even started discussing a transformation of capitalism itself. During the 1970s and in homage to Gramsci, economists from France's School of Regulation revived this expression and used it to describe the self-perpetuating economic process that had been observed during the post-War boom years, one that was based on a redistribution of mass production-driven productivity gains and on a generalised and regular rise in the purchasing power of wages¹. At the same time, sociologists and historians began to use this term (often linking it to Taylorism) when referring at a company level to the mass production system and assembly-line work organisation that had prevailed in the industrialised nations' manufacturing sector since the Second World War, and that was now being diffused to the developing world.

To be fair to this concept and to its inventors and more open-minded users, we should remember the research problems it has allowed us to resolve or overcome². The first merit of the macro-economic studies done by the School of Regulation is to have divided capitalism into separate periods, a breakdown better able to account for the exceptional economic and social growth of the 1950-1970 period and the durable slowdown of activity since the monetary and oil crises of the early 1970s. The planned and generalised redistribution of most productivity gains into greater purchasing power for the general population has been portrayed as the event that gave birth to the boom of the post-War years and to a generalisation of so-called mass production. Unsurprisingly, the exhaustion of these same productivity gains, notably because of increasingly heavy investment, was portrayed in some quarters as an endogenous cause for the crisis of this type of growth regime (henceforth called "Fordist"). This vision has turned out to be more fertile than the two others that prevailed at the time (and which contrasted with one another): Monopolistic State Capitalism, an idea designed by Communist economists who thought they were in the presence of a stage of capitalism that called for a socialisation of the means of production; and a vision wherein the sudden cessation of growth in 1974-75 was merely an after-effect of a few transitory imbalances, since in the opinion of its proponents, capitalism had clearly already devised the definitive recipe for reconciling economic growth, free enterprise and social progress³.

The second merit of Regulation theory is to have embedded the Fordist growth regime in a specific wage labour nexus – based on an acceptance once and for all of the primacy of a company's management in the definition of work organisation in return for a progressive and moderately hierarchical rise in the purchasing power of wages. This idea engendered a slew of stimulating pathways between macro and meso levels of analysis. School of Regulation labour economists saw workplace Fordism, such as it was being described and theorised at the time by numerous historians and sociologists, as an inevitable mirror image of national Fordism. They thought they could bridge the gap between the two approaches, merging them into one Fordism to be represented henceforth as a projection at two different levels of a single reality.

In reality, these sociologists and historians were employing the term "Fordism" less accurately and usefully than School of Regulation economists were doing. Fordism was being presented as a logical extension of Taylorism, which had in their opinion instituted a division between the design and execution of work. Moreover, because of its fastidious and maniacal prescription of everything down to the smallest gesture, Fordism had supposedly pushed this division as far as it could go. Although the expression "Taylorism-Fordism" was used to refute the diffuse technological determinism that some pundits still believed in, this still had the enormous drawback of inducing the idea that it was enough to abandon one of these models' alleged attributes (such as stopwatch timing, a methods department, assembly-line work, or the separation between manufacturing and maintenance, etc.) for the gap between design and execution to be eliminated and for a durable reversal of the division of labour to begin. The damage this vision inflicted during the debates on post-Taylorism and post-Fordism (and again today with the "return to Taylorism"

that certain people have been predicting) is common knowledge. As we will see below, Taylorism is nothing more than a historically delayed, temporary, and relatively insignificant form of the division between design and execution. Moreover Fordism was born in opposition to Taylorism, which was judged to be not efficient enough to guarantee production quantities and quality in a timely manner.

In short, people use the expression “Fordism” indiscriminately nowadays to talk about a plethora of things including: assembly-line organisation, work fragmentation, the prescription and codification of all tasks, de-skilled and repetitive labour, work rates, the use of unskilled labour, omnipotent methods departments, the separation of design and execution, the tyranny of foremen, excessive hierarchy, rigid procedures, classification and norms, continuous flow production, planned production, integrated value chains, single item product lines, large series production, mass production, mass consumption, an emphasis on productivity, an obsession with volume, production-driven sales and consumption, top-down decision-making, high wages as the price of social harmony, redistributing productivity gains into purchasing power, institutions that contribute to the corresponding wage labour nexus, and others too numerous to mention. The greater the number of traits attributed to Fordism the more they lose in coherency, and many people today are more comfortable and find it more expedient to define Fordism as everything that precedes and contrasts with what we are supposedly witnessing today, namely: flexibility, responsiveness, diversity, innovation, the removal of barriers, less hierarchy, people who are responsible for themselves, multi-competency, professionalisation, raising of skills, an inverted division of labour, dialogue, individualised pathways, wages and assessment, financial profits, customer service, market orientation, and many more.

But as soon as we start to analyse each of the traits attributed to Fordism and its alleged successors, it becomes apparent very quickly that none are specific to any one configuration. Is Fordism the child of a combination of the aforementioned traits? This may be the case, but must all these elements exist for Fordism to exist? Which traits are necessary and sufficient in and of themselves? Above all, what explains their specific combination or coherency with one another - a mindset, a paradigm, institutions, a culture, a historical movement, a compromise, a productive and social philosophy, practices, shared challenges, etc.?

As we can see, it makes no sense to perpetuate current imprecision and confusion, especially when asking (as we are doing here) who were the real Fordians. Using the concept of Fordism in research nowadays without any prior conceptual clarification cannot help but generate erroneous results; smoke screens; and even worse, idle chat⁴.

2. A need to devise analytically distinct concepts in lieu of the general term “Fordism”

So where does all of this lead us? Knowledge can only advance via an unending repetition of a cycle in which the shortcomings of proposed theorisations are identified; concepts clarified; hypotheses given; field surveys undertaken; theories developed; the incipient analytical scheme's limitations and dead ends tested; and new research questions asked – the process that we have tried to follow as part of the GERPISA research programmes. The present section will try to clarify the concepts that are needed to replace the hodgepodge that the “Fordism” concept has become. We will be looking for ideas that are distinct and operational, and these clarifications and distinctions will sketch out a new analytical matrix. Now, everyone knows that matrices of this sort do not actually reproduce reality. Rather they are ways of seeing things as they really are – and of better understanding the real world in all of its (limited but renewable) diversity.

A. Fordism and Taylorism are merely transitory and non-exclusive forms of the separation between design and execution

They are neither defined by this separation nor did they give birth to it. They are not even the culmination thereof. The separation between design and execution is more accurately described as the “intellectual division of labour”, since no task is so limited that it does not require a minimum of thinking and previous learning. It is a particular and historically specific form of the division of labour. It spread via the diffusion of a capital-labour relationship contrasting with the product and guild-defined division of labour that had once prevailed in Europe. Retrospective illusion has given some people the impression that before the “Scientific Organisation of Work” was introduced, labour used to be quasi-craftsmanlike, reflecting the unequal distribution of intelligence throughout society. Yet the intellectual division of labour had already gone through a number of stages by this time – many of which were much more significant and decisive than Taylorism or Fordism ever were. Clearly it is not possible in the present article to write a complete history of this subject, which, contrary to popular belief, has had a tormented and varied past that remains largely unexplored. However, in my opinion, there is one analytical matrix that has survived the passage of time relatively unscathed (compared with so-called Japanese model of re-skilling or competency mobilisation that is in serious difficulty today). This concept is the intellectual division of labour’s development in relation to the diffusion of the social relationship that gave birth to it, that is, the capital-labour relationship.

Remember that when the capital-labour relationship first manifested itself the interests of market-oriented capital moved to appropriate what actors should demand as well as their ability to decide which type of products they should be making. This appropriation was the founding act of the intellectual division of labour, with “complete” workers losing the ability to influence negotiations with customers likely to be interested in the goods they were making - and thereby losing control over the value attributed to their labour. Once this aspect of the production process had been “hived off”, the intellectual division of labour continued by dividing up the manufacturing process, operating at the behest of manufacturing capital interests that delegated product design and manufacturing responsibilities to a new category of employees (called foremen) before splitting the overall process up amongst a series of professions born out of this segmentation of the “complete” job. Design and supervision were then separated, before being further subdivided at the behest of the interests of industrial capital. Similarly, each manufacturing profession was divided between industrial operations carried out by employees working on (and maintaining) multipurpose machines, and the many handling operations that accompanied them and which were allocated to unskilled labourers. In terms of the manufacturing process itself, the ensuing phase consisted of replacing manufacturing and machine maintenance work by specialised machine supply and supervision operations, on the one hand, and by maintenance work, on the other. Unskilled labourers were promoted to machine operatives. Most manufacturing professionals disappeared, a few staying on as maintenance workers.

Here it is very important to understand that the intellectual division of labour entails more than merely separating tasks on the basis of how much knowledge and experience they require. Instead and above all, this type of division involves changing the intellectual content of tasks, notably by introducing technological processes designed towards this end. An intellectual division of labour can for example, assume the surprising form of rearranging and recombining once separated tasks or functions that are completed using a competency which has already been modified and de facto diminished⁵. Examples include a slew of maintenance and quality control operations. Thanks to automatic detection mechanisms and standardised pre-determined parts or modules exchanges, such operations can be delegated at lesser cost to operatives who have only received a short period

of training. Certain companies' "promotion" of these operatives to a new "manufacturing professionals" category is nothing more than a traditional way of getting people to accept a new work organisation and hiding what is really at stake - in the present case, something that should really be called the "de-skilling" of labour and of maintenance employees. So how should we portray Taylorism and Fordism using this sort of analytical framework?

Each major phase in the intellectual division of labour redefines the terms of work-related uncertainty. When Taylor first put forward his ideas it had been a long time since the main issues had been how to relate to one's customers or how to fund one's means of production. Nor were product design or production process organisation prime concerns, as had been the case during the "manufacturing" phase. With industrialisation, employees either became "machine-using manufacturing professionals" or else unskilled labourers who retained responsibility for their own work rates and continued to determine how much time was needed to accomplish the tasks facing them - since they were the only persons able to make these decisions and to resolve the endless difficulties they faced in achieving their goals.

Clearly one major problem is a great variability in the time required to complete a given task or in the quality of a person's work - not to mention certain employees' use of "work slowdown" practices to improve their bargaining position in view of future piecework rate negotiations. A host of technical, organisational, managerial and social solutions were thought up and implemented - in other words, Taylor's method was only one of many. Moreover, it has often been portrayed wrongly, involving neither a radical split between work preparation and execution, or even a stopwatch dictatorship. The Taylorist preparation of labour consists of finding out which sequence of operations and gestures are the most efficient and economic in time and energy. For good reason this sequence is ascertained after consultations with the most skilful and experienced employees, not secretly in an office somewhere. A Taylorist engineer is a front-line operative, much as Taylor himself was. The sequence deemed to be optimal does not undermine the intellectual logic driving a task's completion or a product's manufacture - unlike other systems, notably assembly lines (see below). By rationalising these actions and making them more systematic, Taylor's method socialises the processes that the most efficient employees have devised themselves, and does this in a different way to a random, conditional and socially skewed inter-worker transmission of knowledge. The first error has been to believe that the sequences established in this way and the times allocated (or negotiated) on a stopwatch basis will comprise an optimal solution regardless of the individuals, situations and circumstances involved. The second error has been to assume that substantial higher wages suffice for people to accept and apply fixed operational modes. The third has been to imagine that employers will actually offer higher wages and no longer use the unemployment weapon to get people to accept the new work norms.

Taylor's method was supposed to reduce work-related uncertainty as it had evolved at a particular phase in the intellectual division of labour. It did not purport to act upon the actual division itself, since this would have been beyond its purview. Taylor himself said this, surprised at the success of his idea. In certain favourable conditions Taylor's methods did reduce work-related uncertainty and improve performance, but the main problems remained. Work rates, production volumes and product quality continued to be directly dependent on employees, their individual capacities and desires and the agreements they signed. More broadly and as we will see below, the Taylorist model was a productive model that tried to implement (amongst other things) a profit strategy which emphasised diversity and flexibility as profit sources. This was one possible strategy within the framework of the modes of growth that were around during the first half of the 20th century, especially in Europe⁶.

It was a new leap towards an intellectual division of labour that again transformed the contours of this debate. This leap forward consisted of removing employees' control over the amount of time

they spent on their manufacturing-maintenance operations. It was achieved by introducing specialised machine tools and assembly-line work on the one hand, and by separating manufacturing and maintenance on the other⁷. Handling operation workers could now become machine or assembly line operatives, whereas manufacturing professionals were given a choice between moving to generally smaller or medium-sized companies where the intellectual division of labour might not yet be so advanced or else becoming maintenance workers (or even joining the ranks of the unemployed).

Specialised machine tools like the assembly line broke for the first time with an existing intellectual logic of labour. This is because they inferred uniform working times at each workstation (called “cycle times”) as well as distances of identical length from one station to the next. An entirely new problem arose at this juncture. To avoid wasting time and space and to preclude any line disturbances, operatives at each workstation would have to undertake a specified number of operations whose requisite execution, i.e., operating time and space was to be as closely matched as possible to the cycle time and to the inter-workstation distance. Assembly line work operations were to become independent of one another and distributed randomly amongst the workstations. The product’s functional logic, which had given meaning to the sequence of manufacturing operations, disappeared. Deprived of all intellectual sustenance, operatives would be forced to memorise operations that were entirely unrelated.

We know that this breakdown (called “balancing”) of elementary operations between assembly line workstations never quite succeeded in getting operating times (the sum of the times needed to carry out the operations allocated to a given workstation) to match the cycle time exactly. Balancing would be particularly off whenever a variety of products and persons were involved. Where a given operation presented several variants (i.e., a different sized screw might require a few tenths of a second more to be tightened) the workstation’s operating time had to be raised to account for this. Operating time calculations would also have to account for situations where workers succeeding one another at a given workstation were unable to complete its operations at the same speed of execution. Also, operations would have to be redistributed and the balancing recalculated each and every time a product modification was introduced, a frequent occurrence. This would lengthen preparation and explanation times. The assembly line also created interdependency between workstations so that a problem arising at one of them had a knock-on effect on the others. The line would freeze any time someone was absent and not replaced immediately, whenever a mechanical incident took place, if the supply of a given part was interrupted or if a product flow were poorly synchronised between different lines or line sections or interrupted upstream or downstream. In addition, work would be disturbed whenever an operation was poorly executed or forgotten. All in all, time wastages, production shutdowns and the need to recruit additional persons (as replacements, quality controllers, alteration specialists, etc.) could increase the time theoretically needed to achieve a given output by more than 50%.

So how should we represent the productive models that appeared in the automobile industry at this stage in the intellectual division of labour (the Fordian, Sloanist, Toyotist and Honda models, if the typology we have developed is a relevant one)? In terms of this one aspect, note that all three models offer different recipes for reducing the time wastage that results structurally from the application of assembly line and specialised machine-tool principles⁸. Of course, each model will act upon a different technical element to achieve its purpose. A Fordian line is not a Sloanist, Toyotist or Honda one.

B. Fordism and Henry Ford reconsidered

As a second clarification, the national growth regime that the School of Regulation called “Fordist” and which supposedly characterised the post-War boom years owed little to Henry Ford and only affected a few countries at best. It has been claimed that Henry Ford decided in 1914 to

pay his workers them fixed hourly wages totalling \$5 for an 8-hour workday so that they could purchase Model Ts, a decision he announced with a great deal of fanfare. His real reason was to stave off a dramatic haemorrhaging of his workforce, with many workers having refused "to be put in chains". He also wanted to put an end to the social upheaval that was taking place, and was mostly successful in this respect. It was only much later, once he discovered that the upwards curve of his sales was being constrained by the insufficient purchasing power of the vast majority of his employees that Ford theorised industrial and economic reasons to offer them high wages, reproducing (and popularising) an incipient idea taken from elsewhere. As was his wont, Ford launched a public campaign, this time aimed at his fellow employers, trying to convince them that his policy made sense (in the naive belief that he could persuade them to do the same). Unsurprisingly this failed, amongst other reasons because Ford did not realise that labour unions could be useful allies. This was an era when unions were seeking to contract pay increases on a national and branch-wide basis, and were the only parties in a position to offer the necessary counter-guarantees. In the name of employers' unshared authority Ford fought the unions until the very end, thus working against his own interests.

It was Alfred Sloan who understood the need to recognise unions and to negotiate with them guaranteed wage increases and other social benefits. Most importantly in the late 1940s he allowed them to convert the agreements they had signed with General Motors into benchmarks they could force upon the entire automobile industry and even beyond. To be entirely accurate, the so-called "Fordist" growth regime should be called "Sloanist".⁹ Of course, locked up in a cell Antonio Gramsci had no chance to familiarise himself with Henry Ford's mistakes, having been limited to Ford's most publicised writings and commentaries relating to them. In our social mythology (notably in Charlie Chaplin's films and Diego de Rivera's murals) and in academic literature there remains the term "Fordism", efficiently revived by the Regulationists to designate the growth regime that characterised the post-War boom years. In reality, everyone understood or thought they understood what was at stake. It is also true that the expression "Fordism" did not contribute much to the diffusion of Regulationist theses.

Of course, it did raise two problems. Attributing to Ford what belongs to Sloan is not just a question of historical accuracy. In truth the error would be minor if it did not have such major theoretical consequences, i.e., it kept us from seeing the real source of Henry Ford's problems. Even if Ford had changed the Model T or adopted an internal braking system he could no longer expect to achieve any new economies of scale since the market for products considered at that time to be bottom-of-the-range would not be able to grow any further in the absence of a sufficiently generalised rise in household purchasing power. And yet, Ford's "volume" strategy (solely based on the one source of profit) plus his product policy and production system could only become viable if this particular form of national income distribution were implemented. Sloan was no more than a simple cog in the establishment of a new form of national income distribution in the United States. What this required in fact was the particular post-Depression conjunction of several processes that went far beyond any one actor's capacity for comprehension or action: a reinforcement of labour and popular movements; a destabilisation of American capitalism; protectionist urges across the world; the breakdown of so-called mass production; the Second World War with all of its deprivations; intensive ideological efforts in numerous political and intellectual circles; a fear of Communism, etc. All these processes combined to create conditions favourable to the de facto establishment of a national compromise in which productivity gains were shared in exchange for an acceptance of the new work organisation. This compromise was not a masterpiece concocted by a genius inventor somewhere. Instead it was the product of more or less mandatory and involuntary decisions taken by many different actors who discovered ex post facto that when combined the sum total of these decisions could comprise a system.

There is however another reason why we should reconsider the way in which the expression “Fordism” has been used to refer to the growth regime of the post-War boom years. A more in-depth international comparison would teach us that this allegedly “virtuous circle” featured modalities and foundations that varied from one country to the next. In the United States, France and Italy internal productivity gains were split in a way that enabled a regular and moderately hierarchical growth in all households’ purchasing power, but in West Germany and Sweden it was international specialisation (and in Japan it was price competitiveness) that allowed for this same type of redistribution. The significance of these variations can be witnessed in the crises of the 1970s. Whereas the U.S., France and Italy were profoundly destabilised, Germany, Sweden and Japan were on the contrary galvanised, since they were (for various reasons) better prepared to cope with greater international competition. Furthermore, Germany and Sweden’s industrial specialisation and Japan’s export market price competitiveness had no direct link to rising productivity and “mass production”. Not only was the FRG more than just Volkswagen but the success of its national model (until the 1989 German reunification) was predicated on the “quality specialisation” strategy that most of its export firms were pursuing¹⁰. Similarly, Japan’s price competitiveness, long a reflection of wage differentials before becoming a counter-effect of currency parities, turns out over the long run to have been based on Japanese firms’ invention of original productive models, something that was undermined in the 1990s by the bursting of the property speculation bubble and by an accumulation of bad loans in the banking sector.

This is why Robert Boyer and I agreed to use neither the term “Fordism” nor its variants (“Peripheral Fordism”, “Truncated Fordism”) in our book *Productive Models* or in our shared writings. These are all expressions that our colleagues in the School of Regulation have deemed appropriate to apply when describing countries that do not fit in with the canonical characteristics of “Fordism”. We have replaced them with a typology of eight national modes of growth, each designated by its preferred driver of growth (consumption, investment, export) and by the particular form of national income distribution it has adopted (coordinated, competitive, shortage and inegalitarian). These headings, albeit not particularly picturesque or colloquial, have the merit of indicating the characteristics of the two components comprising any given mode of growth, thereby constraining (without entirely precluding) any semantic deviations. Most importantly, we offer a typology that is not as summary as its predecessors were. It enhances peoples’ vision and understanding of growth modes’ (limited) diversity. We have used the expression “growth mode” and not “growth regime” as some Regulation theorists do since this latter term encompasses other components that are not relevant to understanding the potential of the profit strategies followed by the firms we observed¹¹. Towards this end we have made a constant (and in our opinion indispensable) attempt to openly test any and all limitations regarding the relevancy of our concepts so we can replace them as quickly as possible by other more fertile ones¹².

C. Volume strategy, Fordism and mass production

As a third clarification, the “volume” strategy, basically geared towards economies of scale, should not be confused with the Ford production system nor with what is more broadly called “mass production” (and not even with what we call the Fordian model below). In reality there is more than one way to implement this profit strategy. There is nothing self-evident about a concept of economies of scale, which can be used in varying contexts (with each utilisation drawing on a different definition thereof). In our efforts to clearly distinguish between firms’ sources of profits, we have considered economies of scale as savings obtained by spreading fixed costs (i.e., those expenditures that cannot be adjusted to variations in demand, including investments, product design costs, workforce training expenses, marketing or administrative costs, etc.) over a greater number of iden-

tical products (parts or complete products). This occurs when demand rises for a given product, when parts are communalised amongst different products (be it a firm's own output or rival products sourcing from the same supplier), when new models re-use parts from older models, when a model's working life is extended under certain conditions, etc.¹³ What also comes out of this is that the substitution of capital for labour cannot be conceptually assimilated to economies of scale. This assimilation or confusion stems from the "modernist" belief that it is only possible to lengthen a series (and therefore to achieve economies of scale, as long as the market absorbs the surplus output being produced) if increasingly productive labour-saving machines are used¹⁴. We know this to be wrong, as Ford himself wrote, as his experience showed, and as numerous examples prove.¹⁵

The profit strategy we have described as "volume"-based is one that relies above all on economies of scale. This prioritisation tries to generate the required level of profit all by itself and excludes certain other strategies such as the commonisation of parts or a "volume and diversity" strategy, where economies of scale are combined with gains derived from "surface" diversity. Conversely, the typical "volume" strategy applies a single model aimed at a "core target" of "deeper" market segments, or the extension of a model's working life by re-orienting it towards a new customer base, such as one that is in an initial equipment acquisition phase: young persons, women, developing countries, etc., as long as volumes are sufficient and it costs no more to maintain its production than it does to replace them. To pursue a "volume" strategy durably, demand must grow constantly and be homogeneous, and the workforce has to be abundant and active. Mass-producing fewer standard models that are specific to each major market segment will of course enable lower prices and greater solvency for a greater share of the population - but market extension runs out of steam quickly if national income distribution is not coordinated and relatively egalitarian.

A "volume" strategy also necessitates increasing quantities of the right type of workforce. For this to occur, first of all there need to be sufficient reserves. This happens for example when there is significant underemployment; when certain social categories (rural population, women, etc.) become wage-earners; when internal or external migrations take place; or when production units are located in those "emerging" countries where products and profits can be re-imported without punitive taxation. This workforce must also be usable, i.e., it has to possess the requisite characteristics for the chosen work organisation. Clearly it is very hard to unite these market and labour conditions at a national level, and even more so at an international one. We know of no growth modes that can guarantee such conditions. This is why it has only been possible to pursue a "volume" strategy on an exceptional and/or temporary basis (i.e., during market takeoff phases). Also on many occasions the strategy has soon been in trouble, either because of the fact that a market's limitations cannot be overcome in growth modes that are marked by a competitive distribution of national income, or else due to the socially and geographically diversified demand that is found in modes featuring coordinated distribution and moderate hierarchy.

Only egalitarian regimes in centralised and administered economies are theoretically in a position to be able to durably guarantee the conditions in which a "volume" strategy can be viable: an absence of market uncertainty; homogeneous demand; the lack of alternative products; the obligation to employ people, and for people to work. However, as shown by the Communist countries, economies of this sort will in fact introduce other obstacles to impede the strategy's success, notably inconsistent sourcing and irregular work rates. Even once its enabling conditions have been met, a "volume" strategy implies that the means can be found to ensure continual economies of scale. With regards to product policy, such means must make it possible to offer (in an increasing number of countries) an individual transportation product that is judged for a certain period of time at least to be necessary and sufficient in both price and utilisation terms for the needs either a vast majority of the population or of a large market segment. In design, supply, manufacturing and sales terms, the productive organisation must be conceived of in such a way as to ensure that specialised facilities are

put to continuous use. The employment relationship must offer conditions of employment that are sufficiently attractive to get people to accept a type of work that consists of reproducing the same object time and time again. If a firm can come up with means that are capable of satisfying the aforementioned requirements, it will have to share a double conviction: that there is a need to make available to the greatest possible number of people one or several standard products that fulfil the population's essential needs and aspirations; and also that achieving a coordinated and relatively egalitarian distribution through economies of scale is a good idea.

3. The Ford production system and the “Fordian model”

These enabling conditions for a “volume” strategy help us to understand the problems that Henry Ford had to face so early on in the United States, and abroad in Europe and Japan. Retrospective attempts to smooth out the rough edges of the past (to convince people of the novelty of Fordism) has made non-specialists forget about two very important historical facts: the trials and errors and uncertainties that featured in the development of the Ford production system; and the fact that it was soon in crisis. We will review these two factors now and see why it is that the “Fordian” model was only really born after the Second World War; and to what extent it differs substantially from the Taylorist and Sloanist models.

A. The Ford production system: developmental trials and errors followed by crisis

High-volume output and falling prices preceded both the introduction of assembly-line work and production integration. It was only two years after the Model T's late 1908 launch that Ford started to follow his engineers' advice: first by installing specialised machine-tools and organising his production process into a succession of phases (as other carmakers were doing); and then by implementing assembly-line work in 1913 (generalising it in 1915). By this time output had already reached 395,000 vehicles and the sales price had fallen by \$490. It was also at a relatively later date that Ford first thought of integrating the automobile production process from steel through to the finished project. In 1920 he did this at the second-largest plant he built, River Rouge. It was his recurring problems in getting the desired quantities, quality, delivery times and prices for parts he was sourcing from outside suppliers that motivated him to design and build an entirely integrated unit.

As such, half of the fall in Ford's sales price had occurred before assembly work even began to spread, and well before he integrated his production process. This reminder of the chronology and circumstances surrounding these two tenets' adoption shows that neither constituted an attempt to extend a high-volume production logic in such a way as to maximise economies of scale. Instead these were means for Ford to overcome the problems he was having with non-skilled workers and with suppliers. They brought about a sharp rise in fixed costs and created complex problems relating to how operations should be broken down between different workstations and how flows should be synchronised¹⁶.

Well before these attempts to limit production disturbances, however, Ford had to deal with a sudden rise in voluntary worker resignations following the introduction of the first assembly lines. The solution he found to staunch this haemorrhage was the 8-hour workday paid at a fixed rate of \$5. The idea was innovative and attractive for three reasons: it introduced the 8-hour workday that people had long been demanding; it offered a fixed daily wage; and it doubled average wages. In Ford's opinion assembly lines would help him to forecast daily output without having to resort to variable scheduling. They would also allow him to enforce a specific production rate without having to offer a performance-related bonus in return. Lastly, he felt that the economies of scale this would achieve could enable a distribution of profits that was more favourable to his employees¹⁷.

Ford went through two difficult periods, one in 1918 and the other in 1920. Sales fell much more quickly than total demand did, and even though they recovered when general trading conditions improved the second time around their rise was no faster than the market as a whole. Even worse, the price war that Ford himself had declared eroded his profit margins - and worst of all, one year later his sales began to fall even as the overall market continued its upward trend. By 1927 Ford's annual sales were down to 400,000 units. After recovering briefly in 1929 output dropped even more sharply as the Great Depression broke out, with Ford being overtaken first by General Motors and then by the outsider Chrysler (the former definitively and the latter until the Second World War). Ford's "machine" began to fall apart just nine years after the Model T's initial launch, and fewer than three years after his generalisation of assembly lines and organisation of a \$5 daily working wage.

In fact the homogeneous and growing demand that had ensured the success of the *Model T* only existed in the United States for as long as it took to develop and enrich social categories of independently wealthy individuals or highly paid employees, whose income and needs began to diverge so that they started to turn to vehicles that corresponded more closely to their changing economic and social circumstances. Since the vast majority of wage earners were not in a position to enter these market categories (due to the absence of any nationally coordinated increase in purchasing power), the "volume" strategy was doomed to fail. In short, what the Ford production system lacked to become a durably profitable productive system from the very outset was not a coherency of means (Ford's means were coherent, and remarkably so). What was absent instead was the macroeconomic and societal framework that could help to perpetuate a "volume" strategy.

B. The "Fordian model"

The above clarifications and historical reminders mean that we can now offer a more operational definition for the Fordian model, which can be defined¹⁸ as a productive model that:

- implements a "*volume*" strategy that cannot be durably pursued unless income distribution is relatively egalitarian or differentiated into only two or three big and very homogeneous social groups, first at a national and then at an international level.
- satisfies the requirements of this strategy by
 - *product policy* whose purpose is to offer a standard model at the lowest possible price to the entire population or to each major market segment
 - *productive organisation* (ranging from design to sales) that is: highly centralised and sequentially integrated into a continuous chain; mechanised and operates at a specified speed; based on predetermined and standardised elementary operations that are divided amongst the different workstations in an independent and undifferentiated manner to fully saturate the cycle time
 - an *employment relationship* guaranteeing workers who lack the requisite skills a fixed wage that is not related to their output and offering a regular rise in purchasing power for a specified daily work duration.
- relies on a *company governance compromise* that is mainly agreed by executives and unions, and which is based on access to mass consumption in exchange for an acceptance of the productive organisation.

C. Three distinct models: Taylor, Ford, Sloan

There are three reasons why the *Taylorist model* should not be confused with the Fordian model. The first is that the former was devised and implemented in order to resolve a problem that typifies a medium series type of diversified and variable production, workers' slacking or "soldiering" to use Taylor's own words. This is a voluntary slowdown in working speeds by employees paid for each task

they accomplish or for each item they produce, their purpose being to keep employers from cutting their pay whenever output rises. This problem disappears if the production line is mechanised, as is the case in assembly line work.

The second reason is that contrary to what has been said and re-said on this subject the Taylorian division of work into elementary operations does not entail breaking with the intellectual logic driving a given product's manufacturing and assembly organisation - for the simple reason that the sequencing of gestures that needs to be established and which employees must be persuaded to accept does not have to work within a standard cycle time that is common to all of the workers in a given workshop, as is the case with manufacturing lines or specialised machines. This is why Taylor said that his method could be applied regardless of the type of work involved, whether skilled or unskilled, intellectual or manual. Taylor's method implied a work analysis that could only be carried out with the help of the most experienced employees. He was also well aware of the fact that his method presupposed similar physical capacities and competencies to ensure that people stayed within each task or part's time parameters. Hence his much-debated idea that employees be strictly selected on the basis of the physical and mental requirements of each task. The Taylorist model corresponded well and truly to a more accentuated division of the intelligence of labour, since a specialised department would henceforth be responsible for establishing which work sequence was most efficient. It was no revolution, however, as some have said.

The third reason is that the Taylorist model is incapable of physically enforcing (through machines and equipment) whatever sequence of work has been deemed to be the most efficient. Hence it contains a twofold obligation: that this sequence be legitimised from a technical and human point of view (greater efficiency without extra fatigue and without undermining the product's manufacturing logic); and that any employees who accept this system be given back a share of the productivity gains it achieves in the form of 30-100% higher piecework rates.¹⁹

The *Fordian model* contrasts with the Taylorist model on the three preceding points - which as we can see refer to product policy, productive organisation and the employment relationship. The problem that Ford faced was very different from the one Taylor faced. Mass production of a standard product implied mobilising an abundant workforce replete with skilled manufacturing workers. But in the United States at that time this could not develop as rapidly as Ford would have liked, due to the dearth of manufacturing professionals, the time it took to train them (even though this could be shortened somewhat using Taylor's method) and the difficulty in getting them to accept time allocations, despite increased pay. In reality, the Fordian model's productive organisation developed progressively based on a critique of Taylor's method²⁰. The solution it imagined (although others were possible) was to physically enforce a given work rate by determining the speed at which the product being manufactured or assembled should move down the line.

As previously mentioned, this solution created a number of balancing and synchronisation problems. To resolve the former, operations were split amongst the various workstations solely according to a logic based on time cycle saturation, thus putting paid to the earlier intellectual logic based on product development. For the first time, operatives had to memorise operations that had no logical connection to one another. The execution time for each operation no longer needed to be (and could no longer be) determined by analysing and timing an employee's work. Instead it would now reflect the time required for each elementary gesture, calculated once and for all. A workforce lacking in the requisite professional training could then be recruited for any and all manufacturing tasks. The Fordian productive organisation can only be efficient if suppliers provide (at exactly the right time) semi-products or parts with rigorously standardised physical and chemical characteristics. It was Ford's recurring difficulty in satisfying such needs that motivated him to set up an integrated production process and to try to synchronise its various subsections.

Between the determination of a given task's time allocation (based on studies of the best way to

sequence the operations that comprise the task and optimise its intellectual and physical realisation); and the enforcement of cycle times by controlling the speed at which products move down a line and by dividing up fragmented and logically unrelated operations – this new system truly constituted a conceptual, productive and social break with the past. Only observers adopting *ex post facto* a linear vision of history (in which one approach necessarily paves the way to the next) could or can overlook this reality.

It is no surprise then that the Fordian and the Taylorist models also contrast in terms of their employment relationships. There is no need for wages to be differentiated to reflect the extent to which time allocations are met or tasks competently executed. Work rates and job specifications are enforced and shared by all. Yet people must be persuaded to accept an extremely restrictive productive organisation, one that is so constraining that the first employees to experience this system tried to free themselves from it by quitting in droves (since the labour market conditions at the time were conducive to this sort of behaviour). The solution to get them to stay included a triple innovation, one that was coherent in terms of its product policy and productive organisation: a doubling of manufacturing workers' wages, something made feasible by the new productivity gains; a fixed daily wage that had become possible and tolerable due to identical cycle times and job specifications; and a fixed 8-hour workday made possible by regular output targets and appropriate to the demands that employees were putting forward at the time.²¹

The *Sloanist model*, named after Alfred Sloan, President of General Motors, was also explicitly created to break away from preceding models. For Ford both workers and users had to accept the new production and consumption norm (an assembly-line production of standard products to satisfy the necessary and sufficient needs of much of the population) since this was the only way to give the greatest possible number of people access to industrial products. In their desire to satisfy a demand whose hierarchisation had risen in parallel to the development of a middle class, the executives at General Motors, less ideological and more pragmatic than their counterparts elsewhere, tried to find a way to render volume-enabled economies of scale more compatible with increasingly diversified final products. Towards this end they invented a new automobile architecture that consisted of sharing the largest possible number of invisible parts and subsystems amongst models that only differed in terms of their visible parts and elements. This product policy required diversity control at many different stages (design, production and marketing) and firms had to avoid the sort of simultaneous under- and overcapacities that resulted from shifts in the demand for different models and versions. The solutions found to stave off these risks included distinguishing between strategic and operational levels; structuring firms into divisions; organising design in a matrix-like manner; getting subsidiaries or subcontractors to produce components; and developing multi-specialty machines and staff members. To get people to accept this productive organisation, it was accompanied by a wage and promotion system that was based on polyvalence (the ability to carry out different sets of specialised and predetermined operations) and by a planned classification-based hike in employee purchasing power. The Sloanist model differed from the Fordian model in all respects, including in regard to the assembly line, where multiple products created specific balancing problems that needed to be resolved.²²

The structural differences between these three models explain why they coexisted historically in the same national space, and not only with one another but also with other productive models whose presentation is not relevant to the current argument. A rapid chronology suggests that at some point during their coexistence the Taylorist model was in the process of disappearing, the Fordian model was in full bloom and the Sloanist was just emerging. Yet this coexistence was no temporary thing, with one model replacing its predecessor simply because it was technologically superior or fit in better with market demand. In reality, all three models corresponded to different “profit strategies” and “company governance compromises”, as we call them. The “diversity and flexibility” strat-

egy was never as popular in the United States as it was during the rise of the Ford production system; which only became durably profitable and transferable in parallel to the affirmation of the Sloanist model; and only in countries that had adopted a coordinated and moderately hierarchical national income distribution.

In sum, the Taylorist model implemented a “profit strategy” that emphasises “diversity and flexibility” thanks to a “company governance compromise” that guarantees managers greater productivity during the manufacturing of diversified and variable products; and which also guarantees higher individual wages for employees. The Fordian model prioritised economies of scale, meaning that it implemented a “volume” strategy thanks to a compromise between managers and labour unions based on a generalised access to mass consumption in exchange for an acceptance of continuous, undifferentiated and fragmented production. The Sloanist model applies a strategy that combines two sources of profit: “volume and diversity” thanks to a company governance compromise between managers and unions (and based on planned, regular and moderately hierarchical rises in the purchasing power of direct and indirect wages); and to an acceptance of polyvalence during the execution of pre-determined tasks.

Conclusion

For our investigation into who was really a Fordian, we now wield tools that are more precise but also more demanding. Three questions should be answered at this point. Was it the mode of growth that enabled a “volume” strategy to be pursued? Which were the carmakers actually trying to pursue this strategy? Which ones succeeded by adopting the means the Fordian model offers, and by convincing concerned parties to accept those means? To answer the first question we need to find out whether the host or home country’s growth mode included a nationally coordinated and relatively egalitarian distribution of national income, and how long this lasted. To answer the second we would need to ascertain what sort of economies of scale were achieved, and compare them with other profit sources: diversity effects, margins derived from the product’s social distinctiveness, innovation rents; gains derived from the immediate adjustment of costs to general conditions; and cost-cutting in all circumstances. Economies of scale must (easily) have been the leading profit source.

To answer the third question we need to verify whether the product policy, productive organisation, employment relationship and company governance compromise really corresponded to the means that characterise the Fordian model: a standard product that offers few options and which targets a “deeper” market segment; a lowering of sales prices in constant terms; a productive organisation (ranging from design to distribution) that is highly centralised and sequentially integrated via procedures that are standardised and which as often as possible have been mechanically enforced; an employment relationship guaranteeing workers without the requisite skills a wage that is unrelated to their output, accompanied by a regular rise in their purchasing power and established for a specific workday duration; and a company governance compromise that is usually agreed between managers and labour unions and which is based upon access to mass consumption in exchange for an acceptance of the productive organisation.

As we can see, the conditions in which the “Fordian model” become feasible and viable are much more restrictive than many would believe. At the same time, we also hope that when depicted as we have done in the present article they can be much more useful than the confused attributes of “Fordism” have been in helping us to illuminate the past²³.

NOTES

1. Michel Aglietta, *Régulation et crise du capitalisme : l'expérience des États-Unis*, Paris, Calmann-Lévy, 1976. English version: *A Theory of Capitalist Regulation*, London, Verso, 1987; Robert Boyer & Jacques Mistral, *Accumulation, inflation et crise*, Paris, PUF, 1978.
2. If one forgets the boundaries of the debate taking place at the time that an idea is first developed, it becomes easy to attack it using facts it did not account for or neglected, or else to blame it when people subsequently abuse it. Since an idea is nothing more than a tool developed to enhance an investigation or to improve reasoning, by definition it is always a temporary thing. Nor can it be judged in terms of its truthfulness (something that [as everyone knows] is inaccessible since it is impossible to determine all of the enabling conditions behind a given physical or human occurrence). Instead an idea has to be judged by its ability to increase the relevancy and fertility of whatever research approaches the scientific community has chosen to pursue, by helping observers to see what they could not see beforehand and by increasing people's understanding of a greater percentage of the facts they observe.
3. R. Boyer, "Variété du capitalisme et théorie de la régulation", *L'Année de la régulation*, 2003, n° 6.
4. One objection is that since the expression "Fordism" has become so commonplace it is akin to a registered trademark and should be viewed in this way, even if the definition provided does not correspond to the historical reality. It remains that this definition would have to possess a modicum of consistency, i.e., a hard core so that we can accept the variable geometry of its definition, which will vary depending on the author using this term. Inversely, the concept can always be turned into a research topic (to ascertain how it developed and disseminated throughout the general public) - without there having to be any agreement as to its definition.
5. M. Freyssenet, *La division capitaliste du travail*, Paris, CSU, 1974. Réédition 1977, Paris, Savelli; M. Freyssenet, 'Division du travail, taylorisme et automatisations : confusions, différences et enjeux', in M. de Montmolin, O. Pastré (dir.), *Le Taylorisme*, Paris, La Découverte, 1984.
6. R. Boyer & M. Freyssenet, *The productive models. The conditions of profitability*, London, New York, Palgrave-Macmillan, 2002.
7. This was indeed a leap ahead in the intellectual division of labour and not an example of "technological progress". The history of Volvo's Uddevalla plant shows that it is possible to perform much assembly-line performance using a teamwork organisation wherein individuals operating out of a single workstation manufacture an entire vehicle (as long as the employment relationship is such that no one has any incentive to slow down the work's sequencing and completion). Because of its political dynamics, this type of employment relationship would in all likelihood be incompatible with a capital-labour relationship. See: K. Ellegard, T. Engström, and L. Nilsson, *Reforming Industrial Work. Principles and Realities*, Stockholm, Arbetsmiljöfonden, 1991; M. Freyssenet, 'Reflective production: an alternative to mass-production and to lean production?', in *Economic and Industrial Democracy*, vol. 19, n°1, 1998.
8. See M. Freyssenet, 'The Current Social Form of Automation and a Conceivable Alternative: French Experience', in K. Shimokawa et al. (eds), *Transforming Automobile Assembly: Experience in Automation and Work Organization*, Springer, Berlin, 1997.
9. When I made this comment at a 1991 CEPREMAP ARC 2 seminar, in Paris as a member of a panel discussing Robert Boyer and André Orléans paper "The Fordian wage agreement", Alain Lipietz replied that this constituted a prescription, adding "Would anyone think of contesting the term Christianity simple because it has little to do with Christ's teachings?" This may be true but the analogy isn't. Unlike religion, the only thing social sciences have to defend is their right and obligation to develop and test increasingly precise and illuminating concepts.
10. S. Tolliday & J. Zeitlin, eds., *The Power to Manage. Employers and Industrial Relations in Comparative-Historical Perspective*, London, Routledge, 1991.
11. Growth regimes may well be to growth modes what productive models are to profit strategies, that is a politically and socially possible way of implementing said growth modes (maybe we should in fact talk about growth strategies rather than growth modes, even if [as is the case with profit strategies] this involves more of a de facto or assumed strategy consolidated ex post facto than a choice clearly expressed from the very outset).
12. This is indispensable if we are to advance without any further ado. In research initiatives there may be a certain point where artistic license or geometrically variable definitions play a heuristic function or even constitute a necessary phase in the theory's development process - but they are also (and frequently) a way to shirk real discussion and avoid testing.
13. What comes out of this definition is that economies of scale are only one of the modalities that can be used to lower unit costs. There are in fact two other modalities: reducing costs whilst keeping volumes constant; and making immediate adjustments to variations in demand.
14. On the other hand, the substitution of capital for labour is one of the three main modalities for reducing costs whilst keeping volumes constant. The two others are ongoing efforts to reduce waste and to stop time wastage; and cutting purchasing and/or labour costs through competition mechanisms, delocalisation, etc
15. The notion of *mass production* has been deliberately avoided here due to the many ambiguities it conveys. Historically this term has been used (notably by Ford himself) to refer to a high-speed and very precise integrated continuous flow production of a stan-

dardised product. Its usage was then extended to cover the mass production of diversified products that have a number of shared elements in common. More recently people have spoken about flexible mass production to describe a continuous flow production of different products thanks to flexible automated equipment and/or highly polyvalent workers. Flexible specialisation has also been depicted as the culmination of mass production, the idea being that the marriage between mechanics and electronics has eliminated all of the advantages of mass-producing standardised goods. The term of mass production can also be confused with high-volume production, where workers operate out of parallel fixed workstations; or with an assembly line, which is just one way of implementing mass production.

16. Yves Cohen, 'Le plan en action, 1913-1931', in R. Damien & A. Tosel (eds.), *L'action collective. Coordination, conseil, planification*, Besançon, Annales littéraires de l'Université de Franche-Comté, 1998.

17. S. Meyer, *The Five-Dollar Day. Labor Management and Social Control in the Ford Motor Company, 1908-1921*, Albany, State University of New York Press, 1981

18. Robert Boyer & M. Freyssenet, *The productive models. The conditions of profitability*. Londres, New York, Palgrave-Macmillan, 2002.

19. See: F.W. Taylor, 'Shop Management', in *American Society of Mechanical Engineers*, vol. 24, 1902; F.W. Taylor, *Principles of Scientific Management*, New York, Harper and Brother, 1911; H. Bravermann, *Labor and Monopoly Capital*, Monthly Review Press, 1974; M. Freyssenet, *La division capitaliste du travail*, Paris, CSU, 1974. Réédition 1977, Paris, Savelli; M. Freyssenet, 'Division du travail, taylorisme et automatisation : confusions, différences et enjeux', *opus cit.*; D. Nelson, *Managers and Workers. Origins of the New Factory system in the United States, 1880-1920*, Madison, The University of Wisconsin Press, 1975; D. Nelson, *Frederick W. Taylor, The Rise of Scientific management*, Madison, The University of Wisconsin Press, 1980; Patrick Fridenson, 'Diffusion de la révolution', in J.P. Bardou et alii, *La révolution automobile*, Paris, Albin Michel, 1977; A. Moutet, *La rationalisation industrielle dans l'économie française: 1900-1939*, Thèse de Doctorat d'Etat, Nanterre, 1992.

20. D.A. Hounshell, *From the American system to mass production, The Development of Manufacturing Technology in the United States, 1800-1932*, Baltimore, Johns Hopkins University Press, 1984.

21. See: H. Ford, *My Life and Work*, Doubleday, 1922; H. Ford, *Today and Tomorrow*, Doubleday, 1926; C. Sorensen, *My Forty Years with Ford*, Collier Books, 1962; J.P. Bardou, J.J. Chanaron, P. Fridenson & J.M. Laux, *La révolution automobile?* Paris, Albin Michel, 1977; S. Meyer, "The Persistence of Fordism: Workers and Technology in the American Automobile Industry", in N. Lichtenstein & S. Meyer (eds.), *On the Line. Essays in the History of Auto Work*. Chicago, University of Illinois Press, 1989; L. Briggs, *The rational Factory. Architecture, Technology and Work in America's Age of Mass Production*, The John Hopkins University Press, Baltimore, 1996.

22. See: A.D. Chandler, *Strategy and Structure*, M.I.T. Press, Cambridge, Mass., 1962; A.P. Sloan, *My Years with General Motors* New York, Doubleday and Currency, 1963; D. Raff, 'G.M. and the Evolving Industrial Organisation of American Automobile Manufacturing in the Interwar Years', in Y. Lung et alii (eds.), *Coping With Variety. Flexible Productive Systems for Product Variety in the Auto Industry*, Averbury, Ashgate, 1999.

23. Translated by Alan Sitkin.