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The Socialist Entrepreneurs

The case of development of Bulgarian electronic industry *

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The paper presents the results of the author's research on the innovations in Bulgarian socialist economy between 1950 and 1986. The first three parts argue about the problem traditional historiography encounters when studying innovations under the socialist non-market economy because of the inherently theoretical load of the very concept of innovation. They apply Joseph Schumpeter approach to the innovation in non-market economy, developed further by Peter Murrell (Murrell 1990), and critically adapted by the author in the light of the achievements of French sociology of innovation (techno-economic networks approach of Michel Callon) and theory of 'second networks' of socialism, developed by Czech sociologist Ivo Mozni and Bulgarian sociologists A. Boundjulov, A.Raichev and D.Deyanov.¹ The second part of the paper discusses the empirically observed patterns of innovation under the socialist economy and analyses the activities of one key figure of Bulgarian industrial development in the second half of XXth century – Prof. Ivan Popov (Chairman of the State Committee of Science and Technical Progress, Minister of Electronic Industry, Minister of Machine-Building Industry and member of Bulgarian Communist Party Politburo, founder of Bulgarian Scientific and Technical Intelligence Service). The analysis, which is based predominantly on oral interviews, memories, and archival sources, outlines a distinct type of 'socialist entrepreneur' defined by the specific resources he has mobilized to introduces the corresponding innovations, some in the scale of entire industrial branches. This provides a ground for further comparisons with other possible types of 'socialist entrepreneurship', so that we could be able to better understanding of the peculiarities of the socialist economic environment, including the 'deficit' of entrepreneurial motivation and the necessity of its 'import' from abroad (capitalist countries). The paper also enlightens some of the specific barriers to the introduction of original innovations under the socialism.

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¹ See also

<http://www.policy.hu/tchalakov/Tchalakov%20on%20Socialism%20as%20A%20Network%20Society.pdf>.

There's a curious symmetry between the arguments propounded over the last century in advocacy of socialism and the present popular discussion of the reform of former centrally planned economies. In those old discussions, the vision of socialism was utopian, which was contrasted with the Dickensian realities of capitalism. Now, the disasters of central planning are contrasted with the benefits flowing from perfectly functioning markets. In the conventional wisdom of reform, the vision of markets is utopian and that of central planning concentrates on the awful reality. What is largely missing in the conventional wisdom is a satisfactory attempt to come to grips with the central question that should be answered in formulating reform plans: *How does one explain the differences in performance of market-capitalist and centrally-planned economies?*

Peter Murrell, 1991

1. Introduction

During the decades after WW II the 'indigenous' way the innovations have been framed by the agents of socialist economies was the notion of *technical progress*. It reduces the role of entrepreneur and considers the technical changes as external to the economy proper, i.e. as 'exogenous factor'. The introduction of innovations was conceived as a rational process, subject of socialist planning. Interesting enough, up until late 1970s the notion of technical progress was dominant in the neoclassical economics too, where the innovations have been also treated as 'exogenous' to the economic system.

One could find striking similarities the way technical changes was considered both by neoclassical economics and socialist political economy, both sharing what so-called 'diffusion model of innovation' (Callon & Latour 1986) which assumes that technology possesses 'internal' properties and that there exists a 'social' resistance against diffusion of given technology or artefact, so that the clash between technology proper momentum of development and the resistance to it leads to a certain delay in this development. The above assumptions, Callon & Latour claim, define the content of the three main principles behind the idea of 'technical progress': 1) its irreversibility; 2) the 'sociological' barriers it has to overcome, and 3) the time needed a new technology to be established.

Lying behind these principles and ideas is the general 'philosophical' assumption about the asymmetry between past events, which could be always explained by their (in)efficiency, profitability and necessity and present situation, which is always enigmatic to certain extent. More than twenty years ago the new sociology of innovation emerged precisely by questioning this assumption, and by posing the questions: How to understand innovations in their 'proper present', before history has judged with its standard schemes of reasoning? How to analyse and trace technical objects before they became efficient, profitable and indispensable?

I believe these questions are relevant also in studying innovations in former socialist economies – here too we need to leave our privileged position of observers, who already know the outcome, and to try to revive the 'open end' situations, in which the past actors have striven to achieve their goals and to realize their strategies - because the technologies always emerge as a possibility among many others, as matter of dispute. Their profitability, efficiency and necessity are *consequences* from their development, and not its causes. As number of studies have shown, it is

not possible to judge between several competitive projects, based on states of technology, type of economies and markets, or laws of physics – the states are changing, market are created, physics is constructed (or revolutionised). Hence in their emerging and polemic state technologies are ‘under-defined’, vague and unclear. Following Callon and Latour we could say that at this phase the main difficulty stems from the fact that it is at this ‘under-defined’ stage when the most important decisions about the destiny of the technical artefact are to be taken – what to be researched and developed, what marketing strategy to be elaborated, etc. And this is precisely the environment the *entrepreneurs* are facing with, including the ‘socialist entrepreneurs’.

2. Were the socialist entrepreneurs possible at all? Some theoretical clarifications

This section provides theoretical arguments that validate the use of the concepts of ‘entrepreneur’ and ‘entrepreneurship’ in describing the economic activities of (some) representatives of the economic nomenclature in the former socialist countries. These include 1) reconsideration of the classical ideas of Joseph Schumpeter about the development in non-market economies; 2) a new understanding of the complex structure of ruling communist elite, which substantially differs from Schumpeter’s simplistic notion of ‘communist leaders’ or later notions of ‘communist nomenclature’; and 3) arguments from techno-economic networks (TEN) theory about the specificity of innovation process in late capitalism. The arguments, developed in this section serve as conceptual frame for better understanding the empirical evidences, presented in the last part and describing the activity of Prof. Ivan Popov, one remarkable figure in Bulgarian economy during the period of 1949 and 1974. The concluding section summarizes the findings and raises some questions for further research.

In his seminal paper on *Entrepreneurship and Management*, Alberto Martinelli provides a compelling – if brief - historical outline of the concept, pointing the importance of the three ‘classical’ interpretation of entrepreneurship in Karl Marx, Max Weber and Joseph Schumpeter.² For the subsequent development in administrative economies of socialism, it is important to stress that Marx “does not distinguished between the owner of capital and entrepreneur, and does not offer much insight into the specific features and behaviour of entrepreneurs as collective actors” (Martinelli 1994: 477), considering them in a kind of ‘deduction’ as personification of the capital as self-increasing value. Although he provided vivid descriptions of the role of bourgeoisie in the earlier stages of capitalism, much of which could be considered as true entrepreneurial activity, the later was not considered as something distinct for the large theoretical scheme of capital accumulation and growth. His later analyses in *Das Kapital* of the automatic machines and transition from manufacture to factory system of production does not leave much room for the entrepreneurs either, considering them as ‘managers’ or supervisors of production processes in opposition to the workers. One could argue that this specific interpretation of Marx laid the ground

² It is beyond the scope of this paper the early contributions in economic theory of *Cantillon (1755)* and *Turgot (1776)*, who first related the entrepreneurship with the acceptance of the risk and uncertainty inherent to economic activity, or *Jean Baptist Say (1803, 1828)* and *John Stuart Mill*, who introduced the distinction between entrepreneurial function and supply of capital.

of a tradition, where under the notions of 'socialization of production', of the 'alienation of labor' and its reverse appropriation under communist society the specific entrepreneurial function was largely neglected. For many decades entrepreneurship as a concept will practically disappear from the textbooks of Marxists political economy.

In his economic analysis Max Weber retained much of basic Marxist assumptions pointing, however, the cultural factors that distinguished capitalist entrepreneurs from their earlier predecessors, such as "...rational and systematic pursuit of economic gain, calculation based on economic criterion, the relation between trust and credit, and subordination of consumption to accumulation, etc" (Martinelli 1994: 487). In his famous analysis of Protestant ethics and other writings, he managed to provide much more concrete and detailed picture of the role of the individuals in shaping the behavior of capitalist class as whole and in the functioning and development of modern institutions of capitalism, which somehow prepared the room for the subsequent analyses.

It was Joseph Schumpeter (1912), however, who decisively linked the entrepreneurs with innovation, defining them as risk-takers, relatively independent of inherited property and introducing new combination of the factors of production, thus breaking the static equilibrium of the circular flow of the economy³ These ideas shed new light on the mechanism of economic development in the capitalist market economy, preparing the advent of the economy of technical changes as autonomous economic discipline (see Rosenberg 1976, Nelson and Winter 1976, Dossi and Freeman 1988).

In an earlier article I argued that the classical Schumpeter's theory of the role of entrepreneurial activity as the driving force of economic development in market economy, outlined in his *The Theory of Economic Development (1934)*, contains major premises, notions and explanations that provide important keys to understanding development in non-market economies, more particularly the economies with centralized planning and state ownership of East European countries (Tchalakov 2003). The first argument to support this is the fact that Schumpeter explicitly compares market economy with private property with non-market economies without private property, and he voices in passing some ideas about the mechanism of economic development in what he calls "communist" economy. Secondly, the Schumpeter's theory is relevant to the study of rapid industrialization (in fact "industrial transition") in some of the former socialist countries like Bulgaria – since it is not a theory of equilibrium, but of *development*, and the "development", "progress", "leap", "catching up with", etc. were not only ideological slogans, but the core of the economic efforts of socialism. As Janosh Kornai points out in his *Political Economy of Communism*, what he calls 'forceful growth' is "the type of growth typical of the system", one of the fundamental features of classical socialist economy. (Kornai 1992: 193)

³ Few years later Frank Knight (1921) added to the important distinction between risk and uncertainty in economy as tool to discriminate for the truly entrepreneurial behavior. Martinelli adds to this line of development the contributions of Israel Kirzner, made many decades later (1973), who defined the entrepreneurial competition as discovery process and stressed role of the alertness, creativity, and judgment as inherent features of entrepreneurship and economic action in general. (Martinelli 1994: 485-86) Yet we should focus on Schumpeter in an attempt to understand astonishing neglect of entrepreneurship and related concepts in the accounts of socialist economies during the decades around WW II.

Put in brief, the main findings of Schumpeter's *The Theory of Economic Development* bearing on the problem of economic development in market economies could be summarized in the following way:

- The distinction between 'circular flow' and 'development' is fundamental for the capitalist economy. In the first the economic system function in a 'static' state, as a 'routine' following the beaten track of 'past cycles'. The 'development' signifies a specific class of economic changes - the radical, abrupt changes in production.
- The source of development is 'functioning in a different way', i.e. the introduction of innovations (new combinations). Because the new combinations are always more profitable, key aspect of 'economic development' is the competitive elimination of the old forms of production. This process of 'creative destruction' is fundamental trait of capitalism.
- The introduction of innovations is impossible without the function of the entrepreneur. The only contribution of entrepreneurs is their 'will and action' in channelling the existing production resources along new tracks. But the entrepreneurs could not implement new combinations without resources, i.e.
- Having no access to capital - already existing or created ad hoc, which explains
- The essentially different role of credits when the economy functions in a regime of development. Creating 'ex nihilo' means of disbursement (through a plethora of credit tools) and thus ensuring credit to entrepreneurs, the banker seems to 'suck value from the future' into the present economic cycles, hence dynamiting them.

Based on this orderly theoretical scheme Schumpeter⁴ considers the following *specificities of the innovation processes in the non-market (communist) economy*.

1) The important difference concerns the *entrepreneurial function*. This specific combination of 'will and action' is a type of leadership and demands qualities possessed as rule *by a limited circle of individuals*. This leadership is needed not only to break the routine and tradition, but also to overcome the adverse reactions of the social environment in which the new combination is carried out: the resistance of endangered producers ousted from the market by the new combination, winning over consumers, finding allies, etc. Precisely because these are rare qualities providing the possibility for *every potential entrepreneur* to possess [though temporarily] the resources necessary for the implementation of new combinations, i.e. access to credit, was a key condition for economic development.

⁴ The Kirzner's notion of entrepreneur departs from the assumption that 'normal' state of an economy is not the equilibrium of 'circular flow', but just the opposite – a state of disequilibrium, since its functioning is far from perfect. So the specific function of the entrepreneur is the 'discovery' of his own and other economic agents mistakes and their correction, which optimises the economy and approaches it to equilibrium. Considered from the individual perspective the entrepreneur, however, there is little difference whether his efforts could be considered as 'discovery' or 'creative destruction' since in both cases he is running against the inherited routines (Kirzner 1997)

In the *Theory of Economic Development* Schumpeter quotes two cases of non-market economy: a) the isolated kingdom where all the means belong to the signor, b) the isolated communist society in which the central authority possesses all commodities and labor resources and determines all commodity values. What is common between the two cases is that *some individuals enjoy absolute control* over the means of production. They expect no production cooperation, nor do they provide possibilities for making profit to other economic agents. So the problem of access to resources necessary for carrying out the new combinations "... does not exist in a non-exchange economy even if new combinations are carried out in it; for the directing organ, for example a socialist economic ministry, is in a position to direct the productive resources of the society to new uses exactly as it can direct them to their previous employments". (Schumpeter 1934: 68) Hence follows the assumption that 'communist leaders' or the 'central organ' can play the role of entrepreneurs *directly*, without using bankers as middlemen. In the case when the banking system is formally preserved, but is controlled by the leaders, the latter combine both functions: of entrepreneurs and of bankers.

This leads, however, to the *narrowing of the social basis of entrepreneurship*. The direct and absolute control on behalf of the communist leaders over resources deprives the remaining economic agents of the possibility to carry out independent entrepreneurial activities. They are economically unable to become entrepreneurs. Having in mind that only limited circle of individual possess the qualities to become entrepreneurs, the narrowing of the social bases has major long-term effects on the rates of innovations and hence on the rates of economic development in communist economy.

2) The direct control by communist nomenclature over the necessary resources creates an *essentially different situation as regards risks and the speed of introducing innovations*. In market economy the entrepreneur must first persuade the banker, gain his confidence so as to get the necessary credit. The conjuncture of the credit market has a strong impact on the rates and scope of entrepreneurial activity. In non-market economy all this is non-existent. If he deems so, the leader may always withdraw the necessary resources, even risking holding back or worsening the living standards of the remaining social groups.

3) Another important consequence is the disappearance of the phenomenon of '*creative destruction*'. In market economy with private property the profit reaches the entrepreneur only after it has made its way through competition - it is not only competitively distributed among bankers and owners of capital, but also its very existence stimulates the next waves of surrogate entrepreneurs who, attracted by the success and monopoly profit imitate the First Innovator, 'steal' a bigger or smaller portion of the profit until fully exhausting it (the new combination has 'aged'). The communist leaders' direct control over resources in non-market economy does away with competition and economic agents related to it: bankers and other autonomous entrepreneurs.

There are two consequences for development stemming from above. On the one hand the fusion of the functions of entrepreneur and banker abolishes barriers before the quick introduction of innovations. On the other hand, however, it also does away with pressure on sectors working under old combinations. Schumpeter maintains that in socialist economy new and old

combinations can exist in parallel and profit be distributed among them. The complete restructuring of the sector on the basis of the new, more effective combinations is a matter of *authoritative, administrative decision*, rather than a competitive pressure.

Why these Schumpeter's ideas about the entrepreneurial function of communist leaders (or 'nomenclature' - as they became known in the former communist economies) found little influence in the subsequent economic analyses of these economies, up until 1990 they were first applied by Peter Murrell in 1990? In my view there are important reasons for that.

On the one hand it was the development of managerial capitalism, i.e. the gradual establishment of monopolistic or oligopolistic markets in each industrial sector during the decades around WW I, where the large corporations played an increasingly important role, hence sharply reducing the role of individual entrepreneurial efforts. As Martinelli pointed out, during the interwar period authors like Rathenau (1918) described 'organisierte Kapitalismus' as based on depersonalisation of property and passing the same path the modern state did, while Berle and Means (1932) claimed that separation of ownership and control irreversible trend, with the rise of the modern corporation considered as 'organised social group based on interdependence of different economic interests – owners, employees, consumers, and the controlling group (managers). (Martinelli 1994: 488). In 1970s A. Chandler described this process as *the transition from family to managerial capitalism*, resulting from technological innovations, larger markets, international competition, industrial concentration, vertical integration, etc., (Chandler 1977). The period was also marked with increasing involvement of governments in steering economic activities, after the new experience they obtained during the WW II (see Reich 1992).

At first glance even in these economic conditions certain groups of "dependent employees", a term by which Schumpeter denotes technical directors, managers, board members in large companies and corporations, can still be regarded as entrepreneurs and can really fulfill entrepreneurial functions, receiving in return not profit, but a wage increase. He links this phenomenon, however, with the "disappearance of entrepreneurship" in late capitalism, with its bureaucratization, considering the separation of ownership and control as sign of crisis, preparing for advent of socialism:

"With the fading of entrepreneurial function and weakening of bourgeois institutions such as private property and contract, the bourgeoisie declines too, the main reason being the progressive decay of entrepreneurial functions because of routinization of the innovations in large organisations, which render the entrepreneurial function superfluous... The true pacemakers of Socialism are not the intellectuals or agitators who preached it, but Vanderbilts, Carnegies and the Rockefellers. (1942, p.134) ⁵

⁵ See the interesting discussion at Langlois (1987) about whether one could really discern between 'young' and 'old' Schumpeter in his views about the role of entrepreneurial function in capitalist market economy and its disappearance with the increasing dominance of large corporation that transform innovations into routine activity of salaried employees, and which eventually leads to socialism. According to Langlois it seemed that Schumpeter nevertheless believed in the possibility of rational organization of the economy, to which socialization of property, centralization of control and mechanisms of planning appeared as main vehicle. He possible was not convinced in the Hayek's arguments about the limits of centralization and indispensable role of the local knowledge in the economic process (Hayek 1945).

This was the context the socialism as economic system emerged after WW I. Coupled with the tradition of Marxist political economy it left no room for the entrepreneurship as a tool for understanding the processes in the emerging administrative economies. The post WW II dominance of corporate capitalism in USA and other Western countries strengthened the understanding of socialist economy in neoclassical term, the opposition between the two system gradually moving on political and ideological ground (with notable exception of Hayek and Austrian school):

“From 1930s to the 1950s, distinguished scientists with Marxist sympathies – like Bernal, Blackett and Joliot Curie – argued persuasively that public ownership and central planning were better able than the capitalist system to mobilize S&T for economic and social progress. The argument was considered more widely in the early 1960s in the light of the Soviet lead in manned space flight and in rates of economic growth... Indeed, one former economic advisor to President Eisenhower wrote the book entitled *The Price of Freedom*, in which he argued that the pluralism of the capitalist system could not hope to compete with the centrally planned system in mobilizing resources for investment, education and ambitious technical advance.” (Pavitt 1995: 44)

The result was the gradual ‘disappearance’ of the entrepreneur in economic theory. Barreto pointed out that “...with the advent of the modern theory of the firm, the economics lost track of the entrepreneur, [because] the framework assumptions – especially those of perfect rationality, does not allow for a consistent implementation of the entrepreneurial behaviour - role of the entrepreneur reduced to a ‘static, passive and therefore redundant economic agent within a self-running firm.” (Barreto 1989:84) In the decades that followed, the ‘heroic’ entrepreneur appeared in the mainstream neoclassical economics in the paradoxical form of a *sign of underdevelopment and/or distortion of the markets*. As Martinelli put it, the dominant development economists at the time

“...shared the idea that pure entrepreneurial profit would be the smoothly corresponding reward that market conditions require and makes possible. This approach assumes that factors of production are relatively mobile; that producers, consumers, and resource owners have knowledge of all the opportunities open to them; that risk and uncertainty are minimal; and that the influence of social institutions is neutral. The policy implications of this approach for development strategy are: *let the market work, remove the barriers of traditional society, and entrepreneurs will appear from everywhere*. When the above assumptions are relaxed and market segmentation, ignorance, impeded factor mobility, and pervasive administrative controls appear, the ‘extraordinary’ role of the entrepreneur becomes apparent, as does the need to analyze more carefully the factors that can favour his formation.” (Martinelli 1994:485)

From here stems the caricature accounts of the ‘inherent’ deficiencies of the administrative economy, similar to those I found in Amann and Cooper (1982) book on *Industrial Innovation in*

Soviet Union (see also Berliner 1988; Kornai 1992). Talking about the 'rift between science and production', they wrote:

"... This fundamental problem of harmonisation is evidently and exceedingly troublesome one in all societies. In Western countries it is ameliorated to some extent by the fusion of science and production within large industrial firms; many of the problems still exist but the close proximity of the two sides induces some modification of behaviour... In the Soviet context neither the structure of incentives, nor the organisational framework encourages harmonisation of scientific and industrial objectives. Soviet industrial enterprises tend to play only a minor role in research and development... [and] by far the largest proportion of industrial R&D is carried out by specialist institutes which are separate in both an organisational and geographical respect from industrial enterprises... What this can mean in practical terms is exemplified vividly by the case of the AKESR range of industrial control instruments. The initial research was done in Moscow; the experimental plant was set up in Smolensk, 380 km to the West; preparation for production began near Kazan, 1200 km from Smolensk and the final manufacturing plant was located in the Western Ukraine, 2200 km from Kazan... It is an arrangement which flies in the face of a deeper sociological reality and permits the bifurcation of science and industry, inherent to all countries, to develop unchecked. The consequences of this rift are a major theme in Soviet writings about industrial innovation" (p.15).

Reading such texts the reader remains with the tedious impression that they completely missed their target, finding only relative differences between administrative and (corporate) market economy, and referring to the mysterious instances such as 'deeper sociological reality'.⁶ Having fallen in a similar situation, in his study of Eastern European foreign trade Peter Murrell articulated the problem in the following way: "...By applying neoclassical theory in an empirical framework, I sought to discover the characteristic features of socialist economic behavior, but as the analysis proceeded, it became clear that marked differences between the two types of economic systems were not a significant element of the results derived from the traditional economic models" (Murrell 1990: 3-4). And in search for a solution he "sought refuge on a Schumpeterian theory of economic behavior".

3. Schumpeter revisited: the unexpected problems the socialist entrepreneurs had to cope with

Empirical studies of the real functioning of communist economies during the decades between 1917 and 1989 have confirmed most of the Schumpeter's ideas, adding some new

⁶ The superficiality of the reference to 'geographical disparity' became evident if we compare the AKESR example with the scope of activities of Elon Musk, one of the most successful US space entrepreneurs, whose design and manufacturing unit is in California, testing facilities in Texas, while launch pads are in Florida and Marshall Islands.

factors missing in the original model, such as militarization of the economy, specific patterns of foreign trade, economic functions of the secret intelligence services etc., (see Hanson and Pavitt 1987, Murrell 1990, Kornai 1992, Revol 1994, Tchalakov 2003). Yet there are other aspects of these economies, which Schumpeter model simply fail to take into account, but which are of crucial importance to their understanding.

The first aspect is related with Schumpeter's perception of "communist leaders" as homogeneous group. The nomenclature, however, is split in different camps not only vertically, but also horizontally. The division lines and functions of the different groups vary during the different stages of evolution of socialism. Hence the entrepreneurial behaviour of the leaders varies - the internal struggle and constellation of forces between different camps of the communist nomenclature strongly influence the speed and direction of economic development. The recent ideas, developed in the framework of so-called 'historical sociology of socialism' provide a clue for understanding the real dynamics of innovation process in socialist economies⁷, discovering the pendulum-like movement from total dominance of administrative coordination (i.e. taking off the power of mediators - commodities, money) to the rise of 'second networks' (i.e. weakening the power of hierarchies and restoring the power of goods and money) and back.

The second aspect is that Schumpeter takes for granted the source of innovation (invention, discovery). He notes that "... it is no part of entrepreneurial function to 'find' or to 'create' new possibilities. They are always present, abundantly accumulated by all sorts of people. Often they are also generally known and being discussed by scientific or literary writers. In other cases, there is nothing to discover them, because they are quite obvious." (Schumpeter 1936: 87). This assumption ignores major aspects of the relation between the process of discovery and innovation. Recent studies in the fields of the economy of technical changes and science & technology studies (STS) have revealed close interdependence between public investment in science and education and the heavy 'infrastructure work' that mediate appropriation of relevant discoveries in the economy. The socio-technical networks approach and especially its notion of 'emerging' and 'stabilized' configuration might be a crucial for understanding the intimated interrelations between former socialist economies and capitalist economies. (Callon 1992, 1996, see also Tchalakov 2001, 2006)

My hypothesis is that *critical analysis of three theoretical frameworks* - Schumpeter ideas, techno-economic networks approach and historical sociology of socialism - make possible the outline of the specific innovation regime in socialist economies as dynamic interplay between: a) the process of expansion of world-wide socio-technical networks of industrial production, which made former socialist economies compatible in principle with capitalist ones; and b) indigenous mechanism of struggles and negotiations between different wings of the communist nomenclature, hidden behind the all-encompassing administrative coordination (hierarchies). This interplay possesses its internal dynamics, which at the 'surface' of socialist economic development appears

⁷ See for example Mozni 1998, or the papers of D. Deyanov, A. Bundjulov and I. Tchalakov in *Sociological Problems*, Special Issue 2006

as changes in the capacity of socialist economy to introduce indigenous technological innovations and to absorb those made elsewhere.

3.1. The tensions between political and economic nomenclatures as indigenous phenomenon of socialist economy

To begin with Janos Kornai observation, that in the first decades of their existence, all countries with an administrative socialist economy at lower stage of their development as compared to the advanced socialist states, reported remarkable growth and investment rates. For example in the 1960s Bulgaria became one of the most rapidly developing countries, and most of the socialist countries were among the world's 20 front-rankers. (Kornai 1996, p.166) However, in the beginning of the 1970s, the rates started going down and a decade later, they went below zero. How one could accounts for such a dynamics?

Although the entire development of socialism was marked by the internal differences between the various segments of the communist nomenclature, the struggle between two main wings of communist nomenclature – “political” and “economic” ones, was especially important.⁸ The *political nomenclature* comprised the members of organizational and ideological departments of communist party together with secret police as their ‘right hand’ (including those monitoring foreign trade with the West). It possessed the main asset (or ‘capital’) for steering every field of society – *control over the ‘cadres’*, the appointment and promotion of relevant people on key positions. With the reforms that have been gradually introduced in Bulgaria since late 1960 (with temporary hold after 1968) the dominant positions of political nomenclature have been challenged by the increasing power of *economic nomenclature*, i.e. the ‘cadres’ managing the economy -from the lowest position of directors of the enterprises, through the managers of the large vertically integrated state ‘combines’, to the heads of economic ministries and their officers. The later has developed its own sense of unity, its own ‘industrial ethos’ and managed to establish itself as a group opposed to the political nomenclature. From this point of view *the history of the higher echelon of Bulgarian Communist Party was marked by several big clashes between these two wings, each time the political nomenclature taking over the economic one*. This happened first at the end of 1960s with the dismantling of legendary economic cartel “Bulgarian Sea Fleet” (former TEXIM), when the founder and chief manager of the cartel Georgy Naydenov was prosecuted and put in jail under false accusations. The same happened in early 1975, when Prof. Ivan Popov – the man who initiated the successful development of electronic industry and later became deputy Prime Minister and member of Politburo – was dismissed from all his positions and send ambassador to Switzerland. Their high recognition in Bulgarian society, especially among

⁸ More on internal tensions of communist nomenclature see in: Boundjulov, A. 2003. ‘What Emerges in the Place Of? Artificial Joints and Networks Under Socialism’. In: *Historical sociology of socialism: special issue, Sociological Problems* 1/2 (in Bulgarian).

industrial managers, threatened the power of party's organizational and ideological departments, including top leadership of the country.

If we should stick to the Schumpeter's initial model, the separate party (organizational and ideological) units of the nomenclature are absolutely unnecessary for economic development. The economic nomenclature could structure and reproduce itself quite independently. Meanwhile it can recruit people from the enterprises and universities and promotes in the hierarchy the party members who are successful in the introduction of innovations and the development of the economy. Unexpectedly, *it turns out that the economic nomenclature - just like the entrepreneurs in the capitalist economy, faces again certain limitations of its activity.* However, the restrictions now are imposed not by bankers and competitors, but by party (organizational and ideological) nomenclature.

Presumably, during the first stage of accelerated development, this constellation had been advantageous for both sides. The economic apparatus needed an organizational and ideological apparatus to secure resources for the infrastructure and launch innovations in entire branches (what Stalin did in his time), something the economy itself failed to do – “temporary” overexploitation of the peasants, large-scale literacy campaign, creating ample opportunities for secondary and higher education, development of research and information (libraries) infrastructure, scientific and technological intelligence work, mobilization to observe the labor discipline, etc. With the advance of industrialization, however, the situation changed. The administrative system based on “Plan”, socialist “moral sense”, and on overt or hidden “Terror” started to slip.

However, it is not possible to identify the cause of these processes staying in Schumpeter's model only. We have to clarify the nature of planning in the late capitalist economy and henceforth, in the socialist economy, as outlined by the theory of the techno-economic networks (TEN).

3.2. The socialist planning reconsidered. From emerging to stabilized techno-economic networks.

When analyzing the entrepreneurs, Schumpeter considered the keys for economic development in introduction of innovations as new form of economic behaviour, different from the inherited ones. However, already the second industrial revolution in the end of 19th century showed that the new combinations were impossible without the large-scale development of fundamental and applied research. This process unfolded after World War I and more so after World War II when new industrial branches emerged on the basis of the latest scientific and technological achievements.

We cannot possibly analyze the entrepreneur's activity and the introduction of innovations after the Second World War if we don't examine the relation between the production of new scientific and technological knowledge and its integration into the economy – simply because most entrepreneurs are already holders of scientific degrees or have a long length of service in

universities, research institutes and industrial laboratories. The administrative economies in Eastern Europe appeared at about that time. It is not accidental that the “economic application of the latest achievements of science and technological progress” became their major ideological slogan and an immediate practical task.⁹

Promoting the notion of techno-economic network (TEN), Michel Callon notes:

“...Today economic organisation as a way of coordinating different mutually supplementing activities has spread beyond the industrial sphere and the lonely world of the enterprise. Public or semi-public research centres, technical centres, research and engineering offices, etc. are increasingly becoming full-fledged economic actors, like the public political authorities themselves...The entire society and its economy resemble a strange socio-technical complex in which human and non-human actors continuously interact” (Callon 1992, p. 54)

This notion reflects the structure of the market economy in the developed Western countries by the end of the last century. The mechanisms of “translation” between technological solutions and the logic of the market, advanced by the theory of the techno-economic networks, are based on the new understanding of the nature of scientific and technological knowledge as a unity of three interrelated elements: 1) codified knowledge (objectified in scientific texts, formulas and diagrams); 2) technical artifacts (scientific equipment) to corroborate this knowledge; 3) specific skills embodied in scientists and engineers as their ability to use scientific texts, operate the scientific equipment and interpret and compare data and texts.

The development of sciences and technologies implies the establishment and maintenance of a network of local research centers (laboratories) and channels along which the above elements circulate as a special kind of mediators (scientific texts, artifacts and accomplished scholars and engineers). It is a dynamic process of local reconfiguration of the experience when new ways of handling the natural and other agents are devised in the laboratories. After that, the agents circulate *as mediators* along the junctions of the networks where they are “put to the test”. Only then are they endorsed and integrated into the scientific and/or industrial practice.

The studies have shown that this process is extremely expensive and involves a constant high level of investments. The traditional idea of scientific and basic technological knowledge as universally accessible “public good” is thereby changed. It is only because of the local level of investments, that this knowledge can become public good. (Callon 1994) You can benefit from the announcement of a new scientific discovery or a new patent only if you have been prudent enough to invest in relevant workforce and equipment in good time. The development of science and technologies resembles an oligopolistic market where admission is limited – only the “club” people who maintain a high level of investments in (techno) science and the related high-tech industries can “appropriate” the results of research.

⁹ Although having access to the evidences on major efforts of socialist countries in the field of science and technology, Kornai stays away of Schumpeter’s line of reasoning maybe because he too considers technologies and science as an “exogenous factor” of the economic dynamics.

In an earlier text (Tchalakov 2002: 51), we highlighted some specific features of the socialist economy, which impede the application of the TEN approach. The major difficulty stems from the popular belief that this economy is “administrative” and “hierarchically structured” and that the immediate economic agents have practically no autonomy. In the light of the latest findings of historical sociology of socialism, the situation becomes more tangible. We possess now conceptual tools to go beyond the apparent dominance of communist elite in the system of administrative coordination, to describe the presumptive real actors of socialist economy and “give them the floor”.

The analysis of Bulgaria’s socialist economy evidences that *until the early 1970s the key problem had been the copying and diffusion of innovations that already had come out successful in the developed (Western) countries, rather than the development of original scientific and technological products and their application*. Successful innovations had been also the transfer of whole industrial branches such as machine-building, chemical industry, electronics and so on. There had been no attempts to develop independently and introduce original innovations, especially in the military sphere.

If translated into the TEN language, Kornai’s conclusion that “technological progress in the classical socialist economy entails only the copying of innovations in the advanced capitalist states (Kornai 1996, p. 278) would mean the necessity of creating conditions for the simultaneous “transfer” of the three components of science and technologies – codified knowledge, embodied skills and the relevant artifacts. In turn, this implies the integration of these countries’ economies into the global techno-economic network established in the most advanced capitalist economies and to transport the “local reconfigurations of experience”.

Probably the most significant contribution of the TEN approach in perceiving the dynamics of the socialist economy relates to the notion of “state of the techno-economic network”. (Callon 1996) Two such states are distinguished: 1) emergent networks (emergent configurations) and 2) consolidated networks (consolidated configurations). The difference between them is that contrary to the economic common sense, knowledge and skills in the newly emergent networks are rivalry and appropriable whereas in the established networks they are a common public good of universally acknowledged utility.

According to this distinction, in the emergent networks the codified statements (publicized discoveries or patented engineering projects), which are fresh from the laboratory or the research center, prove extremely contestable just like any other commodity. They are not simply statements but a set of “statements+instruments+embodied skills”. Initially this package exists in only one specimen and the first repetition prompts the replications of the other elements of the package – delivering a scientific report, diagram, etc.; securing the necessary equipment; training researchers, engineers and technicians. The “copying” of the instruments is not an easy job. It involves long and complicated operations such as calibration, production of the necessary materials and substances, huge standardization work. All this is carried out through transformations and adaptations. It requires costly investments and considerable infrastructure (assembly lines, theories, scientific and engineering societies, etc.): “...the notion of information is

preposterous unless hidden infrastructure works are underway and investments are available for that purpose". (Callon 1996, pp.49-50) As this process gets along, the mutual interests become stable and the networks intersecting them spread out and solidify so that the statements to become non-rival and non-appropriable. Scientific and technological knowledge turns into information.

The stabilized networks reveal thus quite a different world:

"There are many places where one and the same instruments and embodied skills are available and open to mobilization. They help communicate meaning and utility to the statements that circulate inside the network. With such a configuration the scientific statements are indeed non-rival and impossible to appropriate. This is called universalism inside the network". (Callon 1996, p.50)

In this structured and stabilized world, the programs can be defined in advance because the states of the possible worlds are likewise easy to identify. The possibility "to formulate implicit expectations" is a fundamental property of the stabilized networks:

"...The programs of the different economic actors (corporations, governments, etc.) precede action and set its size and shape. To some extent, they are mutually replaceable because the actors know each other's objectives and mobilize similar competences. Every program engages a certain amount of resources and can establish a relation between them and the expected objectives. The expectations are rational: the actors possess identical capabilities and, therefore, their estimates of the consequences of the action, program, etc., are similar. As a result, the behavior of the competitors becomes predictable." (Callon 1996, p. 51)

I think we are familiar with this world – the objectives and priorities are clear-cut and definite, the necessary resources can be estimated and programmed. But why 'programs' - we can safely call them "plans": annual plans, five-year plans, etc! The plans can be reduced to tasks and behind each task there is an actor with his rights and responsibilities: *"Communism is Soviet power plus electrification of the whole country!" The GOELRO plan...* What followed was a boom of industries: machine building, chemical engineering, electronic engineering, and biological sciences. Simply a techno-economic network or a series of reconfigured networks. However, these networks were already well known, had been "approved" and stabilized in some other places! It remained only to spread and extend them.

3.3. The original dynamics of the innovation process under the socialist economy: the case of Bulgaria.

To sum it up: when a socialist country is building its industry, it is actually in a situation that can be defined *neither as an emergent nor as a stabilized network*. On the one hand, its industry is not yet part of a "long and stabilized network" where the actors have similar competences and embodied skills, similar production equipment and experimental facilities, and stable channels for

the circulation of the scientific texts (“information”). Here the information, skills and artifacts are unequal and asymmetric. They are yet to be established. On the other hand, however, the process of their establishment differs significantly from the emergent networks described by Callon because we don’t have the unique and newly emerged sets of “statements+artifacts+embodied skills”, but rather the sets which are already known.

At first glance, the aim is the same – in the industrializing socialist society like in the newly emergent networks in developed capitalist countries the three elements must be “transported” together. However, along with this, the socialist ‘entrepreneurs’ were saved from the risk of not knowing exactly what should be transported, what behavior “leads to identifiable results” and so on. The communist leaders have learnt about the necessary statements, artifacts and embodied skills much in advance - because they have been identified and spread throughout developed capitalist countries.

It is precisely at this stage, in the conditions of “clearly defined goals” and “predictability of resources” that the advantages of administrative coordination over the market in terms of mobilization and control of the resources, are manifested. It is the time when the removal of the inherently capitalist barriers to entrepreneurial activity produce “positive effects” – the communist elite obtains complete and direct (without the mediation of bankers) control over the resources and receives the entire entrepreneurial profit. The elite enjoys freedom of action, which is not possible to have in the capitalist economy: the adversaries of the system and hence competitors are ruthlessly crushed; because of the communist propaganda, most of the working people are “disciplined and ready to make sacrifice” in the name of the “bright future”. Most importantly, it is generally clear what should be done, i.e. it is possible to plan!

It might be that the socialist project had been possible precisely because of the specific situation in the countries peripheral to capitalism. The catchphrase “Soviet power plus electrification!” fully communicates the essence of this project. In the course of thirty years (1874 – 1904) a galaxy of inventors and industrialists made numerous experiments (Edison, Westinghouse, Nickolas Tesla, Siemens, etc.) and huge resources were spent until electrification stabilized in a form which has remained unchanged ever since: alternating and not direct current; power generation at the raw-material sources and large distance electricity transfer along high voltage transmission lines; consumption in the daytime (through a.c. electric engines) to make up for the evening loading (for lighting, etc.). It was not until after thirty years of experimenting, described by Thomas Hughes in *Networks of Power*, that someone like Lenin could come onstage and pronounce the famous winged phrase encouraging millions of people to perceive the rightness of the course and follow him.

During its first stages, the administrative economy is a privileged world where you can be the “pioneer entrepreneur” and will be protected from the mistakes of those who have built the network somewhere else. This is the basis on which the socialist Plan becomes applicable. However, it is not a “self-conscious subject” (revolutionary vanguard), which stands behind it but a special configuration of stabilized socio-technological networks of developed capitalism. It is this configuration that makes the revolutionary vanguard possible.

It is already clear that what Kornai used to call “copying” of Western technologies screens a much deeper and larger process of reconfiguration of the inherited techno-economic network in the socialist economies. A country like Bulgaria could not profit by scientific and technological learning unless it had invested previously in its own science and technologies and had built its own industry to “appropriate” the relevant scientific and technological knowledge. It did not become “public good” and remained the possession of an oligopoly of several developed industrial states for a long time. This process lasted for almost two decades (from the late 1940s to the mid-1960s) and it was not until scientific, technological and production infrastructure was built in a wide range of branches that the scientific and engineering information became a resource to be mobilized.

Now we are able to outline behind the pendulum-like dynamics advanced by historical sociology of socialism yet another, linear dynamics of socialism. In earlier text I supported the thesis that the socialist economy goes through two stages (Kornai 1992) – the stage of “forced growth” and the stage of decelerated development (stagnation or “zastoi”) [Tchalakov 2002]. Taking in mind the contribution of TEN approach to the Schumpeterian model of socialist economic development, it is possible to distinguish also an *initial stage of creating the necessary infrastructure* (educational, scientific, technological) prior to the of “forced growth”. This is the stage of Bulgaria’s integration into to the industrial states and it can be describe also as a ‘stage of technological optimism’. Back then, the 1947 Law on nationalization abolished private ownership and the autonomous economic agents and the first two-year economic plan became operational. Followed almost two decades until the second half of the 1960s, when the first vertically integrated “socialist corporations” were established (IZOT, Metalhim, Balkancar and others) with their proper industrial research facilities, and the modern institutes of fundamental and applied research at Bulgarian Academy of Sciences were opened. It was not until this first stage of “technological optimism” that Bulgaria could start capitalizing the innovations introduced in the developed Western economies and receive as a dividend the codified knowledge circulating in various techno-economic networks as “information”. At this point, the socialist states that had drawn level with the advanced countries and had become comparable with them seemed ready to enter upon the next stage of development when they were going to rely on their own original projects and innovations.

Such seems to be the story of socialist industrialisation when the TEN-approach and Schumpeter model were applied simultaneously, together with more subtle understanding of nomenclature, provided by historical sociology of socialism.

During these glorious first stages of industrialisation the real entrepreneurial strata in socialist society was not just ‘nomenclature’ or ‘apparatus’, but rather the *socialism economic nomenclature*. And just like the entrepreneurs in the capitalist economy, it faced too limitations of its activity, imposed by the ‘party’ (political) nomenclature. The functions of the latter in a grotesque way resembled those of capitalist bankers. On the one hand, they were controlling the economic nomenclature against personal self-enrichment and misappropriation of resources. On the other hand, when failing to introduce innovations undertake, the economic nomenclature was under thread of being accused for “*vreditelstvo*” and *sabotage*. Such blames could be applied also

against successful industrial managers provided their power, prestige and popularly threaten the power of party nomenclature. In my interviews I have registered numerous such cases of threatening and elimination, where number of talented industrial managers were put in prison.

As we pointed above, during the initial period of building industrial infrastructure and during the phase of 'accelerated growth' all profited by political nomenclature's domination. By the end of period of 'accelerated growth', however, and during the third phase of decelerated development the situation changed – the administrative system, based on Plan, on Communist consciousness, on open or hidden Terror begun to slip and the need of original innovations became indispensable. But what does "original innovation" mean? - It means that the future course of industrialization is not known in advance! Could someone late in 1950s conclude, "Socialism is Soviet power plus an electronics-based economy"? - Certainly, but only some ten years later, because at the end of the 1950s none in the developed Westerners was certain of that.¹⁰ What happened with the nomenclature when copying [Western technology] was no longer possible and the communist entrepreneurs felt unsteady in the "emergent configurations"?

Now we are in better position to answer this question having the triple resources of Schumpeter's model, TEN approach and historical sociology of sociology of socialism: *at this point the seemingly homogeneous nomenclature split and the contradictions between its contingents shot up*. It appeared that earlier stages of industrialization when the economic apparatus was controlled by party nomenclature had negative long-term effect on its motivation for risk-taking.

In the last two section of the paper we provided a revised 'neo-Schumpeterian' theoretical framework for understanding economic development of Eastern European socialism as a specific entrepreneurial driven process. It integrated some classical ideas of Schumpeter with more recent approaches in understanding the innovation process in late capitalist economies (techno-economic network approach) and new finds of historical sociology of socialism about it political and economic dynamics. In the last section we will apply this framework in and account of the activity of one of the greatest economic leaders of communist Bulgaria, which – I believe, exemplify in a nutshell the main features of socialist entrepreneurs.

4. The socialist entrepreneurs as exemplified by Prof. Ivan Popov – the founder of Bulgarian electronic industry

4.1. Bulgaria, 1950s - a newly appointed director at work in a nationalized electro-technical plant

In 1949 a still young Bulgarian engineer returned back from Hungary, where he had worked for more than 10 years at AEG plant in Budapest. Only his closest friends remembered him, but he

¹⁰ However, the managers of IBM, DEC, and of several other private companies *believed* in it because they detected an opportunity for real profits. Taking the risk, ten years later they made the new knowledge and new technology 'universally valid'. (Kidder 1981)

was immediately appointed as executive director of newly nationalized electro-technical plant *ELPROM*:

“... In plant consisted of twelve small private workshops, that became state owned under the Nationalization Law from December 1947. They were spread all over the city, the biggest one being former ‘Bergmann’ factory. Every month there were some accidents, usually by fire: we used antiquated technology to produce tubes for electrical wires made by asphalt. They burned easily, and this was the period of Tchervenkov’s regime¹¹, tough times. So like in Budapest during the war, I was always carrying a small suitcase - I was afraid to be arrested at any time and blamed in sabotage, because of these constant breakdowns in production.

I have a luck then, but several years later I had the same problem with a newly build electro-porcelain plan, part of my combine. The plant was located in the town of Nikolayevo, 250 kilometres east from the capital, and was producing high-voltage insulators, made of three components mixed together and baked in a tunnel furnace. From the very beginning the quality of insulators was far below the required specifications, although we checked everything and even bought expensive testing equipment. At one point I even fired the local manager, yet some series continue to defect in spite our efforts. *Not surprisingly the state security investigated the case and twelve people at different management positions starting with myself were about to face the trial for sabotage.* Finally we had the chance to find out that all defected insulators were from the series, produced during the night shifts and identified a young worker at the dosage installation, which after serious talk confessed she was working almost asleep and was doing the dosage at random, not respecting the prescriptions. Eventually the defective production stopped and the prosecutors had to withdraw their charges against us.” (From the interview with the author)

Already as director at ELPROM combine Ivan Popov begun to teach at the new Electro technical faculty at State Polytechnics, which at that period rapidly expanded. There was urgent need to qualified teachers and many people from the industry have been invited. So in the second half of 1950s he left his directorship to become a professor. However, he preserved his relationships with the industry as an expert and consultant. At one point he even worked for three years in former DDR: after a visit to their new research centre for high-voltage electrical equipment near Berlin, German colleagues asked Bulgarian government Ivan Popov to head one of its departments. Making rapid carrier in Berlin, in 1961 the DDR Government offered him to be appointed as deputy Minister of electro-technical industry. The rumors said that when this came to the ears of Bulgarian communist party leader Todor Zhivkov, he immediately called him back, saying that ‘we have not so much talented engineers to work for foreign governments’. Returning

¹¹ Vulko Tchervenkov ruled Bulgarian communist party between 1949 and 1954, during the last years of Stalin. In 1955 he was replaced under Khrushchev pressure by Todor Zhivkov. During the following the regime was considerably softened. Zhivkov remained in power till the fall of 1989.

in Bulgaria in 1962, Ivan Popov was appointed as head of the newly established *State Committee for Science and Technical Progress*, nominally preserving his professorship.

4.2. The capitalist past of the socialist entrepreneur and its double heritage

However, Ivan Popov experience with industry had much deeper roots. He managed his first ‘plant’ already in 1934 - a small private workshop, he established in Sofia. Five years before that event he graduated mathematics at Sofia University and worked for a year as an assistant professor at the renown Bulgarian mathematician Prof. Lyubomir Chakalov. Then he left his job and went to the Toulouse Polytechnics in France, being “much more interested in applied sciences than in pure mathematics”. He studied ‘electro-metallurgy of non-ferrous metals’ (then a ‘high-tech’ field) and graduated in 1933 with diploma of excellence. He was awarded to specialize for a year at some leading European companies – *Oerlikon*, Switzerland, in Braunsweig, Germany and in a company near Paris, France.

In 1934 he return to Bulgaria, but did not managed to find suitable job – at that time there barely had any local industry in the field, with the exception of a state-owned military plants. But to work for the state was impossible because of his past – *when in high school, he was arrested in 1925 and put for two years in jail because of his affiliation to a clandestine Marxist group*. During the 1930s his brother Emil Popov was also affiliated with communist movement and was executed in 1943 as radio operator of the Soviet residency in Bulgaria. So describing this period Ivan Popov remembered:

“... Coming back to Bulgaria I had to start with the things that I have studied in France. I needed at least a welding machine, which was rather expensive at the time, so I made it myself, buying the needed special tin from a Swedish firm in Sofia. Then I noticed I was not good for welding – my fingers were trembling, if slightly, and I had to change my plans. Considering the various possibilities, I decided to start with business that does not requires too much equipment, and based on skilled manual work. That is how I created this specialized shop –“ELPHA”, which meant ‘Electrical, Laboratory, and PHysical Apparatuses’. I have two “hidden” collaborators, assistant professors at the University I knew from my previous work. They have been teaching mathematics and physics, but both were interested in technology. So I rented two rooms and established the workshop. Later a graduate student came to us (in 1960s as University professor she organized the production of silicon semiconductors in the country).

Although we relied on skilled labour, we needed some equipment and I took a loan of 20 000 BGL from Popular Bank and bought a drilling machine and small lathe for fine items. All the rest we were producing by hand... There were scarcity and hardship in the beginning, especially when the terms to pay the loan were approaching. Yet slowly we established ourselves in the market and the interest to our services was growing. It was the late 1930 years, when the import of electrical and laboratory apparatuses became complicated. With the beginning of the war the Bulgarian laboratories had a lot of problems to supply the necessary equipment from abroad. So the orders to my firm grew

up. I even managed to stop the import of some apparatuses – I copied some of them, others were our own design. For example we produced centrifuges for biological experiments, items for physical laboratories, machines for water distillation, high precision thermostats, etc. ELPHA became so popular, that we got orders from Rockefeller Institute for Contagious Diseases in Sofia, from Bulgarian National Bank, etc. By early 1940s we competed already the importers of equipment and often prevailed in the tenders (at one point I was even offered money not to participate in the tenders!)

Seeking to expand my business, I bought a license from Hungary for household water electro-heater and launched its production. The heaters were relatively cheap and were selling well. But when we redesigned the heater as electric ring, where the temperature was higher, we discovered that it became conductive and potentially dangerous for the users. So we put a claim to Hungarian firm that the heater does not comply with the licence. Meanwhile, I read in a journal about German patent for different type of insulator called 'kohezam'. We experimented with it and found that it is much better than the material the Hungarian firm was using. So I wrote the letter to the firm saying that now we are able in turn to offer them better solution. Soon the Hungarian firm invited me to go to Budapest and to introduce the new insulator in their plant." (Interview of the author)

So in early 1940 Ivan Popov went to Hungary, leaving ELPHA to his collaborators. Instead for few months, he stayed in Budapest for 10 years – first at the partner firm, then as an engineer at one of AEG plant in Hungary. Here he found his second wife, a French woman living in Budapest. So this is where he came from in 1950 to be appointed director of the nationalized electrical works in Sofia.

To summarize our story: by early 1960 Ivan Popov was a man with high standing at Bulgarian university, industrial and political circles having at the same time more than two decades long experience in electrical and mechanical engineering. His experience was accumulated in several different countries (France, Bulgaria, Hungary, East Germany) both in capitalist and 'communist' environment. We are tempted to say that he was 'right person at the right place' when the new opportunity emerged in the middle of the 1960s.

4.3. The dawn of computer industry in the communist block

What was the industrial situation that emerged in Bulgaria by mid-1960s, after more than two decades of socialism? During this initial period the country has already made large-scale investment in all three elements of techno-science: 1) trained a large number of specialists, competent engineers and researchers; 2) set up laboratories, engineering departments and information infrastructure; 3) build its own industrial facilities the light and heavy industry. The *Central Institute of Scientific and Technical Information* began an exchange with kindred

establishments in the world. It hosted a “special department” where experts analyzed the reports of the spies from the *Science and Technology Intelligent Service* and submitted them to the industrial R&D units. “All of a sudden” the scientific and technical intelligence became important - because there already were specialists capable of deciphering the stolen formulas or copied designs and relevant industrial facilities established. Here is an interview with a leading industrial scientist in the country:

“... Since the beginning of 1950s Bulgarian entered a period of rapid industrialization, but up until mid 1960s it was lagging behind the other CMEA¹² countries. For example since mid 1950s it developed heavy chemical industry and several big plants for fertilizers, potassium soda, etc. were build. But it was the period when the other socialist countries were moving to low-volume, high-tech chemical products such as pharmaceutical substances and others. Then in late 1950s and early 1960s the machine building plants appeared, but the country was completely unknown in this field – so at one moment Bulgarian lathes have to be exported under the Czechoslovakian trade marks, no one wanted to buy them. The same was in the sector of electrical home appliances – the newly build plant were again lagging behind those from other socialist countries – for example in late 1950s it started production of radio-receivers on electronic lamps, while the analogous Hungarian plant moved to transistors and TV sets. So in all these industrial branches our partners from CMEA like Czechoslovakia, Hungary, GDR had an enormous head start on us, since these branches had been developing for decades. There was no way we could catch up with them.

Then people started talking about computer technology. *At that time one intelligent man appeared, Prof. Ivan Popov, who made the estimateion that here all socialist countries - not counting the West - were at the same starting line of the race for computer technology. He decided to try and see if the country could enter in this new industry and could be a match for the others when all started together.* He set the task for Bulgaria to build the capacity for producing computer technology and implementing it in our economy... The main goal of Ivan Popov was to win for Bulgaria one of the strategic specializations, which would guarantee high revenues and make it possible to develop a wide, complex industrial structure. (From the interview with Prof. Ognyan Tsumnorechki)

Unlike in other countries, however, there was no relevant industrial experience in Bulgaria in producing such devices. How could it win the specialization, especially in competition with other countries? At that time there were the CMEA commissions selecting the best prototypes and time limits for testing, which were set and approved in Moscow. In each field there had to be at least two competing countries. Here the unique industrial experience of Ivan Popov got to work.

Being already the head of the State Committee for Science and Technical Progress, he reported his ideas at one of the meetings at Communist Party Politburo. Most of its members and especially the First Secretary Todor Zhivkov were fascinated and typically for totalitarian regime,

¹² Council of Mutual Economic Assistance between former socialist countries, established in 1954, known also as COMECON.

Ivan Popov was given significant political power, financial and organizational resources to launch his plan. Although his activity was closely monitored, he had enough freedom for decision making. His plan had three pillars, where and the technology transfer from the West played crucial role:

- 1) Establishing close relationships with Western producers of aimed computer devices. Reverse engineering these devices;
- 2) Building innovative industrial facilities in an unknown scale, and idea which was also borrowed from the West;
- 3) Providing special protected organizational environment for the development of the new industry both a national and international (CMEA) level. In fact Ivan Popov aimed at building a 'socialist cartel', relatively independent from other heavily bureaucratized CMEA structures.

Let us consider these three aspects in reverse order.

1) *Creation of Inter-branch Government Commission on Computer Technology (IGCCT)*

In the early 1960s the Warsaw Pact countries started more and more perceptibly to lag behind in the field of electronics. The needs of the constantly expanding space program and the growing strength of its strategic nuclear forces set high demands on computing technology. Intensive work started in the USSR for enhancing production of modern computing technology and reaching the quality level of such technology in Western countries. Under these conditions, the development of calculating technology was given special attention. The research work done in this field in the USSR was enormous, yet insufficient. Hence the potential of other SMEA partners became of growing interest for the Soviet Union. Some of the CMEA countries already had experience in certain relevant fields: Germany and Czechoslovakia produced precision mechanics, optics and microelectronics; Hungary was a respected producer of electrical home appliances. So the first ideas about intensifying international co-operation were launched.

In order to avoid the clumsy procedures for CMEA, at the initiative of Ivan Popov and his Soviet counterpart, the Minister of Electronic Industry, a parallel structure was created whose priorities were focused entirely on computing technology. In 1969 the USSR, former East Germany, Czechoslovakia, Hungary, Poland, Rumania, and Bulgaria signed an agreement for the creation of IGCCT. In his interview in mid 1990s he describes these events:

“... At that time we exercised pressure on USSR to create a special commission on electronics among socialist countries. We made the proposal together with former soviet minister of scientific devices and apparatuses, which had recently became Vice-President of GOSPLAN. We decide that we need one commission including representatives of all socialist countries, however, it has to outside the structures of CMEA, relatively independent of it.

So we were me and my Soviet colleague who initially designed the IGCCT. And we did it this way, because it was already clear enough that CMEA was rather clumsy

structure, while computer industry was very dynamic field and we wanted to have close control on it. We prepared the entire list of devices we need to produce – the first estimates revealed that it were about 105. Then we distributed it among the partner countries. We, the Bulgarians, took only three, but among the most important ones – memory devices (on magnetic types and magnetic disks), and one of the processors. And here we concentrated all our efforts, because these three devices accounted for more than 40% of the value of a computer center.” (From the interview with Ivan Popov)

The organisation of this IGCCT was quite different from that of the rigid structures in CMEA. For example the decisions were taken not by consensus but by simple majority vote. More important, once taken, those decisions became obligatory for all. Two basic lines of development were chosen in IGCCT – 1) large computers, at the level of IBM/360 and 2) small computers, at the level of the PDP 11 series of DEC. The basic priority was the compatibility between the systems, which distinguished them from their Western equivalents. The aim was to achieve a complete production cycle and provide peripherals and software. The IGCCT was headed by the Permanent President and the Boards of General Constructors, and has specialised managerial structures in different aspects of its activities (Departments of Specialists, DS, and Temporary Work Groups, TWG).

In these management structures each country was represented, both by corresponding experts, and by a Chief Constructor. The standards were presented to the Board of Standardization in the Permanent Commission on Standardization of CMEA, where they were formally ratified. Testing of the products was done by an international commission of the IGCCT. When concrete transactions were made, new bi-lateral testing was conducted. *Maintaining a system of standards and normative documents was one of the most important activities of the IGCCT.* The strategy was to keep the standards compatible with the current and newly developed international standards such as ISO, and those agreed by other (Western) firms.

2) Copying Western technology

Initially, most CMEA countries were not very active in the IGCCT. Bulgaria was an exception.¹³ When it came to competitively determining the specialization of the various countries, Bulgaria had an advantage and managed to receive specialization in one type of processors and two types of memory devices (magnetic disks and tapes). Prof. Angel Angelov, a close associate of Ivan Popov, and Director at that time of the Central Institute of Information Technology, describes how it was done:

¹³ It is important that prior to these events Ivan Popov being a head of State Committee for Science and Technical Progress has already established good contacts with his Soviet counterparts. For example he used the computer 'Vitosha' Bulgarian scientists have just created, to popularise country's potential in field and organised its presentation in several exhibitions in Moscow and other countries. See more on this in "Bulgarian Historical Report" section at Burton P., and Ivan Tchalakov (eds.) (2001) - Project TACTICS (Telematics And Communications Technologies in South East Europe - research report to European Commission), Sofia, LIK Publishers

“...We had to choose our priorities and propose them in Moscow at the session of the Inter-branch Governmental Commission on Computer Technology (IGCCT). Ivan Popov organized a kind of brainstorming together with Prof. Borov, Mihail Krimkov, Gudelkov, and others. We went down to the first computing centre the country just bought from IBM - an enormous hall with over 100 devices. Of all those devices, we chose 4, which, in the final account, amounted to more than 50% of the cost of the entire system: processors, magnetic tape and disk memory devices, printing devices. When I was leaving for Moscow, Ivan Popov said: “If you don’t obtain these specializations for us, don’t bother to come back!” (From an interview) Ivan Popov himself remembered: “... initially we took only three specializations and put all our efforts on it. We copied them from one Japanese and one American firm and put our best specialists to work on it. The selection was in Minsk in conditions of severe competition among the socialist countries. The biggest competitors were from DDR, but our devices – exact copies of the newest japans models won. Which open the road to build all these electronic plants.” (From the interview)

Ivan Popov’s strategy was to choose the most appropriate Western article (for the magnetic tape memory devices the Japanese firm *Fujitsu* was chosen), buy licences, and through reverse engineering, build a production base for those articles. For this purpose all available resources were engaged. The basic task was to produce the prototypes.

While he was negotiating with *Fujitsu* on their license, he collected the best research teams available in the country, which begun reverse engineering on the different parts of the aimed devices. One of the members of such a team explained:

“ Ivan Popov was sending his people to the relevant specialists asking directly how much money they want to develop needed element. One day his advisor came to me and asked: “How much money you need to design the magnetic tape roller?” I was senior researcher and head of the *Institute of plastics and rubbers* and I had a lot of other obligations. So I initially refused his offer. Then he said: “We are not interesting by your tasks, Mr. Popov was told you are the person who could do the job and he wants a personal contract with you. He is ready to pay all you need.”

At that times there was a law stipulating that a state employee cannot get additional payment bigger than his six monthly salaries. To this added that as director of the institute I cannot have a personal contract – it had to pass through the institute, to engage other people, etc., which was a long procedure. So we were six people in my team and I calculated six-months salaries for all of us thinking he will not accept – 4000 BGL (which was about 2500 USD). Then he asked: “How much time you need to fulfil the task?” My answer was we would do it for one year. Few days later the advisor came again with positive answer. I was still hesitant and said that we made new calculations and realized we will need about 6000 BGL. He called Ivan Popov and said: “Mr. Popov want to see you personally!”

When we met each other, Popov said to me: “Here is your offer. So now I am signing for 8000 BGL instead of 6000, and you will sign for six months instead of one year.

And being a member of Politburo, I promise you will take personally all the money, you could pay no one.” It was a big temptation and finally I singed out.

Later I learned he had ordered the same way the electrical step motor, the aluminium construction, all mechanical parts. When we, the designers of different parts later discussed these events among us, we all agreed – it was enormous amount of work and we had underestimated our efforts... But it is how Ivan Popov made us working 12 or 15 hours a day. So in six months he got the entire prototype of magnetic tape memory device. (From an interview with Prof. Ognyan Tsumnorechki)

While all these stories are running on, the negotiations with *Fujitsu* continued. By the end of the six month period he suddenly proposed instead of a license to sign a long term contract for buying determinate number of elements with cannot be produced in Bulgaria. And he asked for their permission Bulgaria to produce and sell this device at CMEA market. He argued that Japanese company would never receive massive orders from CMEA countries, because these were strategic devices and Warsaw pact’s unbreakable condition was at least 95% of the equipment in-built in these devices to be produced inside CMEA (hence not to be dependent form the West).

The president of *Fujitsu* asked for a month to thing on the offer. During this month a Japanese delegation of 30 people visited Bulgaria, which travelled all over the country to look for the possible plants where Popov was considering production. They checked everywhere but found only I antiquated plant in Sofia producing the outdated Soviet type computers ‘MINSK 10’, one of the first computers ever. They did not find even a trace of modern electronics plants. So in the next round of negotiations after a month the president of *Fujitsu* accepted the offer. He though it would takes years for Bulgaria to organize the production of these devices. Ivan Popov has already prepared the list of components he needed to buy, so he was able to bring them with him on his way back to Sofia. And here comes the last element of the Ivan Popov’s strategy.

3) Building innovative industrial facilities in an unknown scale

Together with reverse engineering and negotiations with Western companies, after careful planning (one of the first goal-oriented programs preparing from multidisciplinary team at SCSTP) *Ivan Popov launched in early 1968 the simultaneous construction of **seven** plants, which created the skeleton of the electronic industry in the country.* These plants have been built according to then advanced American technology - multifunctional large production halls with electric wires, water supply and other communications hidden under the floor. This provided flexibility, so that the plants were easily adapted to accommodate changes in production process.

Interesting enough, even those who designed the building did not know what exactly would be produced there. One of his collaborators remembered:

“...I had the chance to participate in the selection of sites for the new plants and when he was giving orders to the industrial architects: “I need a halls 12 meters high with all communications underground (electricity, water, etc.). And we need it in six months!”

The architects often asked about what he need for these premises, but Ivan Popov joked instead – “I will grow chickens”. (From an interview with one of his collaborators)

So instead of few years later, Ivan Popov invited *Fujitsu's* president just six months after they signed the deal to visit the newly build plant near city of Plovdiv where they saw the production line with first five memory devices almost completed. The *Fujitsu* president – former colonel form the emperor's army, was surprised. It appeared that he was also deeply moved and said to Ivan Popov:

“I have never seen such a miracle. Few months ago my people run all over the country and found nothing. For us you were just like empty green meadow. And now you are demonstrating five new devices to key up. I promise until I am president our company will be behind you. I will send you five of my engineers to train your people on production line and we will train at our plants another group of your engineers in "debugging" of the devices.” (The words phrased from an interview with Prof. K. Boyanov)

This collaboration with *Fujitsu* lasted for more than two decades, while Ivan Popov and *Fujitsu's* president remained friends for the rest of their life. During those period more than hundred Bulgarian electronic engineers spent different periods in time in Japan electronic plants.

When few months later in autumn of 1968 the meeting of COMECON committee was held and each socialist country presented its prototype, the Bulgarian (*Fujitzy*) machine showed the best characteristics. Ivan Popov got the specialization. During the next two decades the plant in Plovdiv had produced series of similar devices, gradually increasing and improving their parameters. After this success, he applied the same strategy in developing disk memory devices, copying the relevant IBM devices with 7-8 years delay.

4.3 A victim of his success – the typical destiny of socialist entrepreneurs

With these successes the popularity of Ivan Popov grew up and soon he became one of the most influential men in Bulgarian industry. He was appointed first as head of newly established Ministry of electronics, and then he became Vice-Premier Minister. At the same time since the late 1960s he was member of Communist Party most influential institution – the Politburo. Being primarily economic nomenclature and technocrat, however, he had also numerous enemies, especially among the orthodox members of communist party top political nomenclature. They blamed him for his ‘capitalistic methods’ of management, that he is spending too much money, etc. In 1974 during debates in Politburo on the new five years plan, Popov proposed to simulate the parameters of the plan in one of the powerful mainframe supercomputers that have been recently introduced in USSR and DDR. His proposal faced heater resistance and he was ridiculed for his in ‘technocratic approach’ and blamed of ignoring the ideological importance in maintaining high rates of growth.

After the meeting the First Secretary Todor Zhivkov invited him in a friendly talk:

“-Do not pay attention to other comrades, just do your job”, Zhivkov said. Ivan Popov replied:

- Whatever I do it is for my country, not for myself. But I am not able to cite your name all the time during the debates.

I noticed how Zhivkov’s eyes slowly moved up above my head. I immediately realized what is going to happen, because I have seen this look already... Few months later I was dismissed from Politburo and from the Government and I was sent ambassador in Switzerland.” (From an interview with Ivan Popov)

This typical for Zhivkov’s style of ruling, just to isolate the most successful socialist entrepreneurs, that threatened his power. Then years later he did the same with the Ognyan Doinov, another talented Bulgarian economic leader, sending him not in GULAG, but as ambassador in Norway. As far as the Bulgarian electronic industry is concerned, it continued to develop in the decades that followed, but not the same way. Its managers remained under tight control and never managed to emancipate.

5. Conclusion

We are now in position to outline the main characteristics of the successful socialist entrepreneur, illustrated by the case of Prof. Ivan Popov:

A) *Experience, inherited from the former capitalist environment:*

- Trained in technical sciences both locally and in advanced capitalist countries.
- Possessing leftist ‘credentials’, i.e. some kind of affiliation to communist movement ‘before revolution’ that made possible promotion in economic and political hierarchies;
- Having learned from an individual, grass-route entrepreneurial experience in the local capitalist environment prior to the establishment of socialist economy;
- The local entrepreneurial experience combined both reverse engineering and original (if incremental) innovations;
- Some knowledge and skills in *corporate management*, preparing him for the management of the emerging socialist combines (both during his specialisations after graduating the Polytechnics in Toulouse, and during his stay in Hungary)

B) *Experience, acquired during the early socialist period:*

- Learning how to cope with the pitfalls of socialist industrial management (among them the constant monitoring of the secret police as right hand of communist political nomenclature, maintaining good contact with representatives of political nomenclature, etc.);
- Profiting from the integration between industrial sectors, research institutes and higher education. Double carrier in science and industrial management;

- International contacts with his counterparts in other socialist countries (DDR, USSR, Hungary), as resource in the 'competition' with CMEA partners.

C) *Resources, provided by the administrative economy:*

- The huge resources of the communist party/state, put in his disposal after gaining access to the higher level of economic and political hierarchy, that makes possible
- Launching reverse engineering in the scale of entire industrial branches (including establishment of a system of industrial intelligence), together with
- Planning of both the industrial process in specific branches and related infrastructures (building R&D capabilities, training experts, building capabilities in industrial construction, etc.)

D) *The tragic destiny to be a victim of his own success due to the structural position of socialist entrepreneurs in the political and economic system of socialism.*

The insurmountable conflict between

- Following the 'logic' of socialist industrial development, i.e. the transition of development based on reverse engineering to development based on original innovation, and
- Following the 'logic' of communist political system, which requires submission to the power of political nomenclature, responsible for the doctrinal project.

These features outline the portrait of socialist entrepreneur as tragic and short-leaved, yet exciting figure of socialist economic development.

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