On power inequality, innovation systems and development strategies

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"A weakness of the system of innovation approach is that it is still lacking in its treatment of the power aspects of development. The focus on interactive learning – a process in which agents communicate and cooperate in the creation and utilization of new economically useful knowledge – may lead to an underestimation of the conflicts over income and power connected to the innovation process."
(Lundvall, 2010: 340)

Abstract.- Development is studied by combining normative, theoretical-factual, prospective and propositional approaches. Sustainable Human Development is the normative basis. Agency connects values and proposals. Evaluating its possibilities leads to the study of power. For that the proposed tool is a Marx-Mann conceptual scheme that considers technology, social relations and the interactions between them. It is used for analyzing the role of power in National Innovation Systems as well as the rise of inequality. Strategies for fostering knowledge democratization in the context of Innovation Systems are considered. Problems and possibilities of developmental coalitions are discussed.

Key words: *Inequality, Innovation Systems, agency, interactions between technology and social relations*

Introduction: a guiding thread

The starting points of this paper are, first, the assertion that the NIS conceptualization needs to be linked with the study of power, as stated by Lundvall in the opening quotation, and, second, a sort of converse assertion: such conceptualization can help to study power stemming from the interactions between technology (including "productive forces" but not only them) and social relations (including "relations of production" but not only them). The distribution of power in society is a fundamental source of inequality, the growth of which in the world of today is highlighted in the GLOBELICS 2017 Call for Papers: "The conference [… in particular] aims to explore whether we need new approaches to study inequality in the age of globalization as there are widening disparities within countries, regions and social classes." Taking as a guiding thread the analysis of the connections between power and NIS can help to understand the growing knowledge-base of actual inequality, because the last is closely related with which actors are effectively incorporated to a given innovation system and with the role they play in the system. If that is so, coping with "uneven development" - stressed in the description of GLOBELICS 2017 main theme – requires knowledge democratization fostered by the agency of underprivileged sectors in the contexts of innovation systems.

The previous paragraph gives in a nutshell the content of the paper. It will be elaborated in the following steps.

Section 1 summarizes a notion of Sustainable Human Development as the normative approach that orients the analysis of possible contributions of Science, Technology and Innovation to improving material and spiritual conditions of life. With such aim the paper is presented at GLOBELICS 2017 track 4: Science, technology, innovation policy and development. Development has to do with values, facts, trends and proposals, so development studies need to combine normative, theoretical-factual, prospective and propositional approaches, starting with the first one, that is, with the ethical orientation.

Section 2 presents what can be called a Marx-Mann conceptual scheme for the study of power that considers technology, social relations and the interactions between them. The focus on interactions stems from Marx's theory of history. Following Mann paramount importance is

assigned to economic, military, political and ideological relations. Such scheme suggests a characterization of the capitalist knowledge society and of underdevelopment today. It also suggests three interconnected causes for increasing inequality.

Section 3 offers a tentative analysis of power stemming from National Innovation Systems (NIS) and of the distribution of power within those systems in connection with economic, military, political and ideological relations. Special attention is given to what can be called the "core triangle" of NIS with vertexes representing the productive structure, the government, and the scientific and technological infrastructure. Different distributions of power between them are considered as well as their consequences. The approach is related with Evans' conceptualization of "embedded autonomy" of developmental states.

Section 4 aims to sketch proposals for development that are desirable in terms of the normative approach presented in section 1 and seem minimally feasible in the context discussed in sections 2 and 3. It starts analyzing actual connections between the rise of inequality and threats to democracy. Strategies for coping with both problems have to prioritize knowledge democratization. For that a main issue is the active involvement of subordinated groups in advanced learning and innovation processes, thus becoming agents in developmental coalitions. Some difficulties and possibilities are discussed.

The paper is part of an ongoing research program (Arocena and Sutz 2014, 2017; Arocena 2016).

1. A normative approach to development

A synthetic characterization of development in normative terms is needed. It must be consensual but not trivial, in order to inspire many different but compatible efforts in plural settings. That means that such characterization has to be widely shared and ethically sound as well as an orientation for studying and acting. Such is the case with the notion recalled below.

1.a Sustainable Human Development

Sustainable Human Development has been characterized by the expansion of substantive freedoms and capabilities of people today without compromising those of future generations (UNDP, 2011: 2; Sen, 2013: 11). This characterization seems to be widely accepted. It combines in one formulation the by now classic notion of sustainable development with Sen's notion of human development, where the expansion of freedoms and capabilities not only defines the goals of development but also constitutes the fundamental means of development (Sen, 1999). Thus a sound normative approach to development is also an orientation for propositional approaches. Such fundamental clue is stressed by the emphasis on agency: "we need a vision of mankind not as patients whose interests have to be looked after, but as agents who can do effective things—both individually and jointly" (Sen, 2013: 7).

The needed normative characterization can be summarized by saying that *Sustainable Human Development* is (i) the expansion of people's freedoms and capabilities, both individual and collective, (ii) in order to lead lives that they value and have reason to value, (iii) in ways that preserve and enlarge the possibilities of future generations for living such lives, (iv) assuming that the expansion of freedoms and capabilities is both the defining aim of development and its main tool, which (v) implies treating people as agents, not as patients.

1.b Agency and collective actors

Fostering agency is a clue for connecting values with proposals, so the notion of agency should be clearly stated. Following Long (2001: 182), human agency is defined as the capacity that an individual or a group can have "to process social experience and to devise ways of coping with

problematic situations." In turn, social entities that "can be said to have agency" are social actors; they can be "individual persons, informal groups or interpersonal networks, organisations, collective groupings and what are sometimes called 'macro' actors (e.g., a particular national government, church or international organisation)." (Long, 2001: 241)

The notion of Sustainable Human Development (SHD) with agency as a requisite can be directly connected with inclusive development and inclusive innovation, as considered for example in Cozzens & Sutz, 2014, and Bryden et al, 2017. Inclusive development refers to processes that benefit marginalized sectors and in which such sectors take part. If the last does not happen, such sectors are treated as patients. An agency-promoting notion of development requires that social groups take part in the processes that are supposed to benefit them. In brief, inclusive SHD is SHD focused in the problems of marginalized groups. Solving such problems requires inclusive innovation, defined as "*new ways of improving the lives of the most needy*" (Bryden et al, 2017: 7; italics in original). This view is not restricted to formal innovation: "innovation in informal settings can be seen as an expression of collective action" (Cozzens & Sutz, 2014: 20) where communities are involved in the solution of their own problems.

SHD is an actor-oriented notion of development. As such it "begins with the simple idea that different social forms develop under the same or similar structural circumstances. Such difference reflects variation in the ways in which actors attempt to come to grips, cognitively, emotionally and organisationally, with the situation they face." (Long, 2001: 20) It allows, in general, the recognition of structures or patterns of interaction and of deep trends, without attributing to them deterministic effects and without neglecting social heterogeneity, because human agency is the capacity of giving different responses to similar situations

2. A Marx-Mann conceptual scheme for the study of social power

The normative characterization of SHD leads directly to the study of power. Development means expanding people's freedoms and capabilities to be agents in pursuing the type of life they have reasons to value, while power can be defined as "the ability to pursue and attain goals through mastery of one's environment." (Mann, 1986: 6) Here environment will be understood to be both natural and social.

Cooperation and conflict are both part of power relations which have an "external" dimension, called collective power, and an "internal" one, called distributive power. Collective power is the power that an organized group has over nature or other people. Distributive power is the power within an organized group that is held by those with a major role in coordination and direction over those with a lesser role. Such dimensions cannot be separated:

"In most social relations both aspects of power, distributive and collective, exploitative and functional, operate simultaneously and are intertwined. Indeed, the relationship between the two is dialectical. In pursuit of their goals, humans enter into cooperative, collective power relations with one another. But in implementing collective goals, social organization and a division of labor are set up. Organization and division of function carry an inherent tendency to distributive power, deriving from supervision and coordination. For the division of labor is deceptive. Although it involves specialization of function at all levels, the top overlooks and directs the whole. Those who occupy supervision and coordinating positions have an immense organizational superiority over the others." (Mann, 1986: 5-6)

2.a On social power, technological and organizational

The starting point of the conceptual scheme under elaboration is the following assertion: "The pursuit of almost all our motivational drives, our needs and goals, involves human beings in external relations with nature and other human beings. Human goals require both intervention in nature -a material life in the widest sense- and social cooperation." (Mann 1986: 5) That points both

to technology and social relations or, better, to the interactions between them, as main sources of power.

Social relations as sources of power have been studied in depth by Michael Mann (1986, 1993, 2012, 2013). Fundamental human goals and needs generate Ideological, Economic, Military and Political relations. In the context of such relations action of people and use of resources are coordinated, so organized interaction networks are created and maintained. Power stems from Ideological, Economic, Military and Political relations because of the specific "organizational means" each of them has for attaining human goals (Mann, 1986: 2).

"*Ideological power* derives from the human need to find ultimate meanings in life, to share norms and values, and to participate in aesthetic and ritual practices," (Mann, 1993: 7) "*Economic power* derives from the need to extract, transform, distribute, and consume the resources of nature." (Idem) "*Military power* is the social organization of physical force. It derives from the necessary of organized defense and the utility of aggression." (Op. cit.: 8) "*Political power* derives from the usefulness of territorial and centralized regulation. Political power means *state* power." (Op. cit.: 9) The focus on Ideological, Economic, Military and Political (IEMP) relations as sources of social power characterizes Mann's IEMP model.

The model has been criticized for not giving an adequate place to science, even suggesting that is should be considered as a fifth source of power (Goldstone, 2006). A better option would be to go back to the assertion that human goals require both "a material life" and "social cooperation". The first can be seen as the source of technological power while the second generates organizational power as described by the IEMP model.

Productive forces give a fundamental example of technological power, closely connected with economic power; other examples are given by destructive forces, directly associated with military power, and also by communication technologies, which are basic for political and ideological power as in fact for every organized network. "The fundamental infrastructure of all four sources of […] power is communications. Without effective passing of messages, personnel and resources, there can be no power." (Mann 1986: 136) Mann shows once and again how organizational power depends to a large extent on available techniques.

Thus it can be useful to think in terms of a "Marx-Mann conceptual scheme", where the inspiration of the materialist conception of history leads to paying specific attention to technological power (including productive forces but not only them) and to interactions between technology and social relations; following Mann, attention to the last should not be concentrated on productive relations only but on IEMP (Ideological, Economic, Military and Political) relations. Nevertheless it should be kept in mind that: "Economic networks exercise the most massive impact on collective power in the cumulative long term." (Mann, 2006: 386)

The focus on interactions is stressed by Castells, using a quite usual terminology, where "modes of production" are characterized by relations of production and "modes of development" by technologies. "Shifting from theoretical categories to historical change, what truly matters for social processes and forms making the living flesh of societies is the actual interaction between modes of production and modes of development, enacted and fought for by social actors, in unpredictable ways, within the constraining framework of past history and current conditions of technological and economic development." (Castells, 1996: 18)

Where does science appear? In his presentation of Marx's theory of history Cohen (2001: 47) says: "Productively relevant scientific knowledge does pertain to the material task to be performed, and therefore is a productive force." In a Marx-Mann scheme scientific knowledge appears as an ever increasing source of technological power.

Summing up, it will be assumed that power stems fundamentally from:

(1) Technology enabling the use of material resources in ways that have been greatly increased and diversified since the so called "marriage of science and technology".

(2) Social relations that generate organizational power by coordinating different activities, mainly ideological, economic, military and political, as described in Mann's IEMP model.

(3) Interactions between technology and social relations, a generalization of the interaction

between productive forces and relations of production described by Marx (Cohen, 2001: 386).

2.b The capitalist knowledge society and underdevelopment today

The emphasis on interactions between technology and social relations may help to characterize some main configurations of power that frame today the problems of development. Yesterday the last were posed in the context of the world expansion of industrial capitalist societies; today the overarching power configuration is the capitalist knowledge society that has emerged in the North. The last assertion deserves some brief comments.

If the "structural principle under which surplus is appropriated and controlled characterizes a mode of production", then during "the twentieth century we have lived, essentially, with two predominant modes of production: capitalism and statism." (Castells, 1996: 16) Both were industrial societies, meaning by that "not just a society where there is industry, but a society where the social and technological forms of industrial organization permeates all spheres of activity, starting with the dominant activities, located in the economic system and in military technology, and reaching the objects and habits of everyday life." (Castells, 1996: 21, note 33) The ways towards industrial society were opened by the so called the Revolution of Energy, initially centered in the steam engine, that fostered the mechanization of manufacture.

The Revolution of the Technologies of Information and Communication (TICs) has fostered a comparable world historic transformation. "Post-industrial" societies emerged that may be termed "informational" to indicate "a specific form of social organization in which information generation, processing, and transmission become the fundamental source of productivity and power" (Castells, 1996: 21, note 33). It is perhaps better to speak of knowledge-based societies because not only the TICs but advanced scientific and technological knowledge as a whole has risen to the position of a fundamental source of productivity and power. The last happened while different specific processes of interactions between technological changes and social relations took place; statist modes of production – or state socialism – almost disappeared; knowledge-based and financially-dominated capitalism became the main power configuration, located in the North and shaping the world process called globalization.

In such context underdevelopment can be characterized by (many different combinations of) the peripheral condition and external subordination. The former points to the weak technological positions shaped by specialization in producing goods and services with comparatively low added value stemming from advanced knowledge and high qualifications. In this sense countries and regions in the highly heterogeneous Global South can be more or less peripheral but their situation is different from the centers of the global order, where advanced scientific and technological knowledge is the key source of productivity and power.

External subordination is rooted in the differences in technological power between peripheries and centers. It is seen in different configurations of economic, political, military and ideological relations. A telling example of such subordination is offered by several international agreements and treaties concerning trade and investment that are a consequence of power asymmetries between the North and the Global South, particularly in economic and political terms, and also concerning ideological aspects.

"the WTO Agreement on Trade-Related Investment Measures (TRIMs) has sharply curtailed the ability of developing countries to impose performance requirements on foreign firms, and has prohibited practices such as demanding minimum quotas of domestically produced goods in firms' procurement or exports." (ECLAC, 2016: 150)

"The policymaking discretion of developing countries can also be reduced by provisions contained in certain North-South free trade treaties (in particular those signed by the United States) that limit their capacity to apply capital controls, even on a temporary basis, in order to preserve financial stability [...]. This is indeed paradoxical, considering that in the wake of the global financial crisis the International Monetary Fund —a traditional apologist of financial account openness— recognized the usefulness of capital controls for coping with speculative capital flows" (ECLAC, 2016: 151).

"The commitments assumed in trade or investment agreements can also limit developing countries' policy discretion in public procurement, the treatment of State enterprises, and procedures whereby governments prepare their health, environmental or consumer protection regulations." (ECLAC, 2016: 151)

The quotations show how external subordination can consolidate the peripheral condition. Underdevelopment is a major case of interaction between technology and social relations.

2.c Three sources of inequality

The Marx-Mann conceptual scheme helps studying the "widening disparities within countries, regions and social classes" highlighted in the GLOBELICS 2017 Call for Papers. It suggests that three intertwined factors foster inequality.

The use of power stemming from social relations to improve the position of elites has been thoroughly documented and explained (i.e. OXFAM, 2016). The impact on inequality of distributional power rooted in social relations is shown in USA by "the vicious cycle where the political domination of the top leads to beliefs and policies that enhance economic inequality and reinforce their political domination." (Stiglitz, 2012: 267)

If organizational power is a strong source of inequality, so is technological power.

"The increase in inequality happened in part because the new technologies strongly rewarded more highly skilled labor; drove up the share of, and the return to, capital; and increasingly opened the economies of rich countries to competition from China and India [...]. The structure of demand, and thus of jobs, moved toward services, which in turn were staffed by less qualified and worse- paid labor. On the other hand, some service sector jobs, as in finance, were extremely highly paid. This widened wage, and ultimately income, distribution." (Milanovic, 2016: 54)

The increasing role of advanced knowledge favors highly educated people and often damages the less qualified. It favors capital in its confrontation with manufacturing labor. New technologies are also a source of inequality within the entrepreneurial realm because "exponential, digital, and combinatorial change in the technology" fosters a "winner-takes-all" situation where cheap replication and delivery of the most economically successful procedures allows a small fraction of providers to capture a large fraction of markets (Brynjolfsson and Mac Afee, 2014: 69).

A third source of inequality is located in interactions between technology and social relations.

"Unequal access to knowledge and unequal control over its production or distribution matter in the 21st-century world not only because of knowledge's intrinsic value but also because its unequal distribution causes other sorts of inequality. Knowledge gives political, financial, and existential advantages to its holders. Returns from knowledge allow its holders to reproduce the institutions and relations that sustain their advantages. In such areas as public health, food supply, environmental quality, and lethal combat, applications of knowledge strongly affects who survives and who lives comfortably." (Tilly, 2005: 122)

Unequal control over production and distribution of knowledge means unequal access to its benefits, unequal exposure to its damages and unequal use of it for consolidating the social powers that be. Inequality is fostered by the rise of knowledge-based and financially-dominated capitalism:

"In recent decades, the combination of financial capital and scientific-technical knowledge has gained unparalleled potency in the production of inequality between those who control the combination and those who do not." (Tilly, 2005: 115)

3. Collective and distributive power in National Systems of Innovation

3.a Introduction

Reformulating the characterization offered by Freeman & Soete (1997: 291), the National Innovation System (NIS) will be the name given to the set of actors and institutions and the linkages between them that, at the level of a given nation, promote technological innovation. It includes public policies, production activities, generation and diffusion of science and technology, and higher education.

It is an adequate framework for studying SHD, following the recommendation of Sen (1999: 8-9):

"to investigate the development process in inclusive terms that integrate economic, social and political considerations. A broad approach of this kind permits simultaneous appreciation of the vital roles, in the process of development, of many different institutions, including markets and market-related organisations, governments and local authorities, political parties and other civic institutions, educational arrangements and opportunities of open dialogue and debate (including the role of the media and other means of communication)."

The creators of the NIS conceptualization during the 1980s were inspired by the work of Friedrich List in the 1840s on the "National System of Political Economy". List's aim was to elaborate policy recommendations able to foster the power of the German nation by then economically inferior to industrial Britain. Freeman (1987) explained the economic success of Japan in the decades following the II World War by the strength of its NIS. Attention was driven towards the "external" power of the system as such, that is, its collective power. Explanations were elaborated by considering both technology and institutions in a unified NIS framework that takes into account what different social actors do. Innovation as a social process includes both cooperation and conflict, so its actual outcomes are highly dependent on the "internal" distribution of power among the actors that get involved in the process.

Thus the conceptual scheme sketched in section 2 can help to understand why and how the innovation system of a nation influences both its collective power – the power of the nation as a 'macro' actor – and the internal distribution of power. Power is deeply shaped by interactions between technology and social relations. Industrial capitalism can be seen as a set of specific combinations of modern industrial technologies and capitalist social relations. "Industrial capitalism may have changed the whole population's lives more than any other power process in human history." (Mann, 2006: 386) Why and how do specific combinations of technology and social relations take place? For answering this type of questions, the NIS tradition offers rich conceptual and empiric elements.

As a first step some remarks concerning social relations and NIS can be made. Economic relations are obviously relevant; a NIS exists to the extent that economic networks are able to obtain benefits by pursuing innovations in the national context. Political relations are also important: a classic example is the role of the state in Germany for "catching up" with England and "forging ahead" since the second half of the XIX century; that process was closely related with ideological elements, as for example those stemming from the already mentioned work of List. All the successful cases of late economic development seem to combine political and ideological power to foster the NIS. Military power was relevant in the German rise but the most outstanding example of its influence in fostering technological innovation is seen in the United States since the years of the II World War.

The analysis of collective and distributive power in NIS must pay attention to the main actors in the system, the subject of the next section.

3.b The core triangle of the National Innovation System

Before the elaboration of the NIS and in a different context, a related model was proposed in order to study the connections between science, technology and productive development. Such

model came to be known as “the Sabato triangle” (Sabato and Botana, 1968; Sabato editor, 1975). Its vertexes represent the productive structure, the government, and the scientific and technological infrastructure; the connections between them are represented by the sides of the triangle. Those three ‘macro’ actors are the fundamental protagonists of innovation processes while the connections between them are the fundamental linkages that give a ‘systemic’ character to innovation processes considered as a whole. In this sense the Sabato triangle becomes the core of the National Innovation System.

One of the vertexes of the triangle is the site of economic power; another one is the site of political and military power; those two vertexes define the “upper side” of the triangle. Its technological basis can be identified with the third vertex. The side connecting this vertex with the state vertex represents the interactions between technology and political relations, while the side connecting it with the productive vertex represents the interactions between technology and economic relations. It can be a useful metaphor for thinking about social power and technological change. Concerning industrialization the “strategy that is most likely to be effectively implemented and enforced in a country can depend amongst other things on its internal distribution of organizational power.” (Khan and Blankerburg, 2009: 337) In general the configuration of power shapes national innovation processes, the internal distribution of its gains and losses as well as its consequences for the position of the country in the international order.

Innovation became systemic in the industrialized West with the wedding of science and technology. The last took place mainly in two fundamental institutional innovations of the XIX century. One of them was the industrial laboratory of Research and Development, with its increasing linkages with states and academy. The other one was the Humboldtian university, characterized by the joint practice of teaching and research; initially promoted by the state, it would became a main actor in the generation of science and technology, particularly through its linkages with productive innovation. The core triangle of NIS emerged and started connecting education, research, innovation and production. As other actors and organizations appeared in such connections the innovation system expanded around its core, shaped in each country by predominant economic, political, ideological and military relations, and also by the geopolitical context.

In the catching-up process of East Asia the upper side of the triangle played a decisive role, such that the political vertex was baptized “developmental state”. That role was also remarkable during the period of regulated capitalism in the West after the II World War. The state often established strong relations not only with entrepreneurs but also with labor, regulating conflict and allowing significant cooperation. Speaking about Austria Evans (1995: 241) remarks that a coherent state apparatus provided a centralized bargaining arena between organized entrepreneurs and organized labor. Something similar happened in other European countries, strengthening the NIS and in some way incorporating trade unions to it.

From the NIS and its core triangle point of view, the transition to the capitalist knowledge society means that advanced knowledge becomes decisive in the “technological vertex” and, in turn, that this one is even more important than yesterday for the vertex of economic power as well as for the vertex of political and military power. Such knowledge is relevant to a widening set of activities, so innovation tends to be more distributed; new actors and linkages appear in the NIS; its collective power expands. Conflict also expands and deepens, related for example with research and innovation directions that are prioritized or neglected, learning and technical changes in working places, access and success in higher education, access to sophisticated health techniques, technological procedures in agriculture and food production, environmental impacts and living conditions. In highly stratified NIS, the distribution of power shapes gains and losses of different groups in the knowledge-based and innovation-driven economy. A losing sector has been industrial low skilled labor in industrialized countries, since the new technological conditions of production and globalization have severely weakened its organizational power and thus the bargaining position of trade unions.

Globalization is shaped by the capitalist knowledge society that characterizes the North. The

peripheral condition in the Global South is characterized by specializing in the production of goods and services with comparatively low added value stemming from advanced knowledge and high qualifications. The peripheral condition is reflected in the NIS. In peripheral countries the NIS is often reduced to a small upper side with, in one vertex, some second tier state organisms in charge of innovation policies and, in the other vertex, the relatively few firms that are interested and capable of taking profit of such policies. The ensuing national collective power is scarce. That power grows if in the first vertex more relevant public organisms and officials are involved, and also if in the other vertex the set of productive units is comparatively wider; the distribution of such power will be less concentrated if, for example, such units show different sizes as well as different management and property structures.

The possibilities of overcoming the peripheral condition are highly dependent on the size and strength of the upper side. It also depends on whether the NIS is essentially reduced to that side or includes effectively the whole triangle. The role of the knowledge generation vertex in innovation processes is increasingly important for the configuration of NIS power. The issue is one of degrees: seldom is academy completely absent from national innovation but the situation is completely different – in terms both of collective and distributive power – if that involvement is restricted to a few research institutes concentrated in a privileged region of the country and dedicated to a few disciplines or it has a wide institutional, geographic and thematic scope.

Up to now the main winner of globalization as a nation has been China. Its NIS is strongly expanding. Its upper side is defined by the unexpected alliance between the authoritarian state dominated by the Communist Party and global capitalist networks with an increasing role of Chinese entrepreneurs. Such political and economic power relations look quite attuned with the strong nationalist ideology that prevails and points to strength military power. A clear understanding of where is located today the root of technological power guides a very strong state effort in research and higher education. The triangle as such is consolidating. The collective power of China stemming from its NIS grows quickly. The internal distribution of such power is highly skewed.

3.c The upper side and the developmental state

The conceptualization of NIS has been closely related with rapid the catching-up that took place in some countries of East Asia during the second half of the XX century. That happened with the "upper side" as the main protagonist, with the collaboration of state and capital shaped by the changing distribution of power between them. The role of the first of them in the remarkable expansion of Japan's economic power inspired the elaboration by Johnson (1982) of the concept of 'developmental state'. Thurbon and Weiss (2016: 638) say that a developmental state can "be defined partly by the mindset of its central political actors – driven to catch up and keep up with the industrialized West; partly by what it looks like – an economic bureaucracy with Weberian characteristics (competent, cohesive, mission- oriented, independent from special- interest pressures); and partly by what it does – technology upgrading and strategic industry policy." The first of the three components of such definition stresses ideological power; the second highlights the capabilities of the state, and the third one points to a set of policies that, particularly in the case of South Korea, was crucial in overcoming the peripheral condition.

An interaction between technology and ideological power became relevant: "There is clearly a new spirit of what might be called 'technonationalism' in the air, combining a strong belief that the technological capabilities of a nation's firms are a key source of their competitive prowess, with a belief that these capabilities are in a sense national, and can be built by national action." (Nelson, 1993: 3) Technonationalism was a lever of technological upgrading in the catching up oriented National Innovation Systems of East Asia.

In South Korea, the upper side of the triangle not only fostered the external power of the nation but also an unequal internal distribution of power: "Not only the state's internal coherence but also its external networks are a disadvantage from the point of view of those at the bottom. These networks are remarkable not only for their density but also for their narrow focus. Capital is

connected, labor is excluded. […] Viewed from the perspective of conflict between labor and capital, embedded autonomy increases the coherence of capital at labor's expense." (Evans, 1995: 231)

The state in South Korea was able to foster consistently technology upgrading because the distribution of power inside the upper side was initially favorable. It could enforce a "classic infant industry strategy" that included productive upgrading and learning by entrepreneurs partly because the weakness of landed elites, that "denied the chaebol the opportunity of offering to share rents with powerful social forces in exchange for their support in protecting inefficient rents" (Khan and Blankerburg, 2009: 350) A situation of that type is usually exceptional, has very specific historical roots and tends to be transient: "the extraordinary weakness of local capital following thirty-five years of colonialism and a devastating civil war was a precondition for the degree of autonomy enjoyed by the developmental state. Barring this kind of weakness, individual industrialists always prefer a state less able to infringe on managerial prerogatives. At the same time, the propensity of entrepreneurs to see economic success as derived from their own virtues makes them less likely to see diminished state capacity as threatening to the process of accumulation." (Evans, 1995: 232)

A comparison with Latin America may be interesting. There the period of inward oriented growth (taking place grosso modo from the crisis of the 1930s, a consequence of the Great Depression, to the debt crisis of the 1980s) has been termed "state-led industrialization" (Bértola and Ocampo, 2012). Protection to new industries was in general not dependent on technological upgrading nor restricted to a period considered sufficient for it; that led Fajnzylber (1984) to speak of Latin American "frivolous protectionism" as fundamentally different from East Asian "learning protectionism". The difference may be more one of politics than of policies: in Latin America "alliances between strong landed elites and emerging industrialists" hampered infant industry strategies (Khan and Blankerburg, 2009: 359). That has to be seen in its historical context. At first, industrialists were very weak and had to face a strong opposition from "landed elites", so their bargaining position in face of the state was not strong. As time went by, industrialization diminished the relative power of landed elites that nevertheless remained important, while the power of industrialists increased and, in Evans terms, they tended "to see economic success as derived from their own virtues". The situation invited an alliance between traditional and emerging elites, cutting state capacity for example to promote agrarian reforms and to enforce industrial upgrading. Frivolous protectionism was more a consequence of power configurations than of policy design.

In Latin America during state-led industrialization, subordinated incorporation of labor to the benefits of the process was often significant and even the political basis of some of the most active industrializing governments, those with so-called national popular orientation, in which national entrepreneurs were expected to play a relevant role. The situation changed with the shift to authoritarianism, when the political vertex was dominated by the military and the economic vertex by transnational capitalism, while labor was excluded. That concentration of power had different economic and technological results but the peripheral condition was not eroded.

The exclusionary character of the developmental state (or of the upper side) in South Korea lasted until almost the end of the XX century, but it was combined with comparative small income inequality, a great difference with Latin America stemming in no small measure from an agrarian reform. In Japan, the regime led by the Liberal Democratic Party (LDP) was not dictatorial as in South Korea and Taiwan and also able to foster economic development supported by a strong Innovation System. But already in the 1990s problems became apparent. According to Evans (1995: 235):

"The LDP model gives the political side of the developmental state a softer face, but it is remodeling rather than reconstruction. Since it increases the ability of elite groups to push their bargain with the state in an anti-Schumpeterian direction, it does little to enhance economic dynamism. Since connectedness remains very skewed in favor of elite actors, it offers little in the way of increased external scrutiny to compensate for diminished insulation. Degeneration in the direction of clientelism is a potentially serious problem. Japan's problems, both political and economic, in the early1990s have discredited the LDP model (along with the

LDP itself) but some would argue that it remains the only real alternative to explicitly exclusionary politics. In a market society, the argument goes, the state can only be linked to capital."

If technonationalism was a main ideological factor shaping the catching-up East Asian NIS, aiming at social inclusion shaped in no small measure the welfare orientated Nordic NIS. Elite domination was relatively weakened during a long period (Mjoset, 2016). Innovation was more distributed and molded by linkages between a broader set of actors than in other cases. Such traits are apparent in the description of the Danish Innovation System offered by the Aalborg school (Lundvall, 1985, 2002; Christensen et al, 2002).

Catching-up NIS have been dominated by the upper side of the triangle. "In developmental states, connectedness has meant ties with industrial elites. Can embedded autonomy also be built around ties to other groups?" (Evans, 1995: 228) In other words, can less powerful sectors be effectively incorporated to NIS? The issue will be addressed in section 4. Before, some consequences for NIS of the extreme concentration of power will be recalled.

3.d When one vertex dominates

Military relations have influenced innovation processes of the great powers since the dawn of history. Military and ideological relations shaped deeply the NIS of the two empires that fought the Cold War.

In USA power became highly concentrated in what Eisenhower called the "military-industrial complex". It seems that he intended to call it the "military-industrial-congressional power", that is, "an alliance of economic, military, and political elites. But the complex (sometimes called the national security state) did not dominate the whole state." (Mann, 2013: 40, 41) Although highly influential in the other two vertexes of the core triangle of the NIS, it did not dominate the whole productive sector or the whole generation of knowledge.

In the Soviet Union the dominance of the state vertex was such that it absorbed the whole NIS. Very high priority was given in innovation efforts to military issues. Innovation was scarcely distributed between different actors and activities. Freeman and Soete (1997: 303-304) highlight the extremely high proportion of R&D (more than 70%) dedicated to military and space, as well as the weak institutional linkages between organisms and activities related with innovation. The command economy was not suited for fostering it. Neither were the vertical political relations nor the ideological monopoly. The degree of distributional power concentrated in the top echelons of the state weakened the collective power of the NIS. Prevailing social relations fettered innovation, technological and organizational. The Soviet Union lost the Cold War in the field of production.

With the withering of state socialism, the victory of capital over labor and even over the state (Halperin Donghi, 1992) became evident, within the main countries of the West and beyond, through the impact of the globalizing capitalist knowledge society, coupled with the ideological power of neoliberalism and the policies of free trade. Perhaps such situations can't last:

"free trade has ruled the world only in two very brief periods of human history: the late 1800s, and the late 1900s and early 2000s. In both periods the cult of free trade came to an end for the same reasons: not only did free trade as a goal rather than a tool create intolerable poverty in the world periphery, but it also started an economic decline at the very core of capitalism." (Reinert el al, 2016: 781)

The dominance of the economic vertex over the whole NIS went up particularly in the United States; there and in many other places, the power of that vertex became highly concentrated in its top echelon, financial capital.

"The ability of international financial agents to move capital and resources across borders and between currencies constrains governments and effectively gives capital veto power over an array of policies. The fact that capital movements are still unregulated, and that tax evasion continues to undermine States, despite the prospect of a new financial crisis in the making, is a testament to the political power of capital." (ECLAC, 2016: 170)

It seems that such dominance erodes the collaboration between the public sector and big firms in the generation of technological knowledge. Main productive firms in the United States have greatly benefited from technological innovation fostered by the state but now are giving less support to such activities and paying more attention to short term financial aims (Mazzucato, 2013). If that trend is consolidated, the distributional power of financial capital would keep rising while the collective power generated by the NIS would diminish.

4. Learning upgrading in developmental coalitions

4.a From inequality to de-democratization

The capitalist knowledge society is generating serious threats for democracy:

"Currently democratic regimes that do not exercise new collective controls over financial capital, information, media, and scientific-technical knowledge and/or redistribute value produced by them will therefore risk de-democratization, hence decline in their subject population's well-being." (Tilly, 2005: 206, author's italics)

Winners of globalization are one source of such threats; it points to plutocracy:

"Since it is in the interest of the rich to promote the current process of globalization, from which they are […] strong beneficiaries, and since the middle class and the poor can at least formally derail that process, the focus of the rich is on democracy suppression (even though some of the measures are not consciously implemented as such)." (Milanovic, 2016: 200)

Risks of de-democratization also stem from a different source. The increase of inequality fosters the ongoing right wing reactions in the West backed by losers from knowledge-based and capitalist-driven globalization. Many supporters of such processes are people harmed by deindustrialization, with poor employment possibilities because of low educational levels. "In an advanced economy, at least some of the types of services that are 'replacing' manufacturing may be relatively high- technology, high- skills, tradable, increasing- returns producer services with strong linkages with the rest of the economy." (Tregenna, 2016: 725). Such people feel harmed by immigration. The reactions they back are chauvinistic. Their leaders present other nations and foreign people as scapegoats. As history teaches and what is happening in the US seems to confirm, political democracy is harmed by such processes and the concentration of power is increased rather than diminished. Those reactions attack at the same time financial regulations, the welfare state, international cooperation and environmental protection. They damage their less favored supporters in particular and humankind in general.

So the concentration of power in globalizing elites fosters plutocracy at the expense of the welfare state and political democracy, while chauvinistic reactions against such elites may be even more harmful for both of them. Now:

"the need for representative democracy—which makes it possible for a large number of people to live together in some measure of agreement while retaining a degree of control over their collective fate— is also the best argument for the traditional state. […] It is because the free flow of capital threatens the sovereign authority of democratic states that we need to strengthen these, not surrender them to the siren song of international markets, global society, or transnational communities." (Judt, 2008: 424)
"Just as political democracy is all that stands between individuals and an over mighty government, so the regulatory, providential state is all that stands between its citizens and the unpredictable forces of economic change." (Judt, 2008: 425)

Compacts or coalitions able to defend representative democracy as well as the welfare and

regulatory state need to confront the roots of inequality.

4.b Diminishing unequal distribution of power by means of reactive or proactive agency

Above it was asserted that increasing inequality has three sources; they can only be separated in a very simplified description that aims to point out different ways of coping with rising inequality.

The first source has become famous under the label "for, by and of the 1%"; it is the combined use of power stemming from economic, political and ideological relations to favor the top echelons of elites. Facing such actions requires among other things the construction of political coalitions with a broad social base and a redistributive agenda. Let us call them popular coalitions. Political and ideological power relations are involved. Their shortcuts notwithstanding the so called progressive turn seen in the government changes in several South American countries during the first years of this century showed that possibilities for diminishing inequality in this way have not disappeared.

Another source of inequality – highlighted by Tilly as quoted before – has to do with prevailing interactions between knowledge and social relations, mainly economic relations. They can be partially described by saying that only privileged sectors are really integrated in innovation systems. Coping with this problem requires fostering inclusive systems for generating and using advanced knowledge in socially valuable ways, where the problems of marginal groups are given priority. That is a fundamental example of what is meant by knowledge democratization. It seems to need the combination of public policies with initiatives and efforts of trade unions, cooperatives, social movements and the like, that is, collective actors related with not privileged social groups. The latter maybe loosely called popular actors. Usually neither the agendas of popular coalitions nor those of popular actors pay much attention to building inclusive systems for democratizing knowledge. Of course relevant exceptions exist.

A third type of inequalities stems directly from the actual social role of advanced knowledge. Access and success in higher education is on average an increasingly relevant source of income and influence that is still denied to many people. It is an almost necessary condition for participating effectively in decisions concerning research and innovation. It is a main way for rising to positions near the economic and political elites. Thus it is directly related with the previously considered types of inequality. Consequently it should not be a surprise that those opposing the expansion of free access to public universities often include today people who yesterday benefited from it. To make advanced education not a source of inequality but a lever of knowledge democratization it is necessary to generalize access and success to higher education.

What has been said in the previous paragraphs is related with the following assertion, not less valid in the South than in the North:

> "an advanced democratic country would actively seek to reduce great inequalities in the capacities and opportunities for citizens to participate effectively in political life that are caused to an important degree by the distribution of economic resources, positions, and opportunities and by the distribution of knowledge, information and cognitive skills." (Dahl, 1989: 324)

Seeing people as agents is the main orientation for propositional approaches to Sustainable Human Development that stem from its normative characterization. Redressing inequalities has not been frequent in history without the agency of subordinated groups. Such agency has to overcome differences of power, organizational and also technological. As Mann stresses, the groups that coordinate and control the most important social relations have in general a remarkable organizational superiority over the rest of society. This is a first factual problem for the agency of popular actors that stems from the conceptual scheme sketched above. A not smaller factual problem stems also from that scheme inasmuch as it stresses the increasing role of advanced knowledge in power relations. What kind of agency can subordinated groups have in the context of knowledge-based and capitalist-driven globalization?

It is a fact that such groups are often capable of reacting against damaging processes in ways that improve their situation. Governments based on popular coalitions can, if economic surplus is on the rise, foster redistribution and thus redress inequalities to some extent; but they are less able of promoting economic policies that differ much from prevailing ones. Trade unions are sometimes able to obtain significant improvements in working conditions; but technological evolution and actual social relations make that quite difficult, particularly in industry, while leaving small spaces for cooperatives or similar ways of organizing production of goods and services. Populations harmed by polluting activities of big firms often fight against them; but especially in underdeveloped countries they are curtailed by lack of own expertise, the power of their adversaries and because some people want to get a job related with such activities since they see no other opportunities.

Agency mainly against something (neoliberal policies, workers exploitation, contaminating activities, etc.) may be termed *reactive agency*; it is a factual and not normative denomination. *Proactive agency* of an actor is agency for promoting a project of that actor. For example, a group that acts in the context of an innovation system in order to promote specific projects for knowledge generation and use shows proactive agency. As it usually happens with schematic classifications of social action, boundaries between those two types of agency are not strict. Even so the above distinction is not useless. It helps to remember that access to advanced learning is increasingly a necessary condition for proactive agency of popular actors in the increasingly knowledge-based social relations of today.

4.c On the South American experience

The recent experience of South America is quite telling concerning possible agency of popular actors. As said, during the first years of this century the convergence of political changes and economic bonanza driven by the increasing prices of commodities generated strong redistribution and the historically high inequality was diminished. Trade unions and several other social movements backed redistribution. But neither they nor political parties in general became agents of new learning and innovation policies. Such issues were scarcely incorporated in their agendas. Their agency was much more reactive than proactive.

As in other places, the estrangement between advanced knowledge and popular actors is apparent in South America. Consequently, when the bonanza weakens, an old problem becomes more difficult to solve than yesterday: “The problem of adding a project of accumulation to a redistributive agenda is even more daunting than the problem of adding a redistributive agenda to a project of accumulation.” (Evans, 1995: 239) After the commodity boom it is apparent that productive structures have not been strongly transformed (ECLAC, 2016). Progressive governments were scarcely willing or able to play a role as the “articulating vertex” of the core triangle in NIS.

Nevertheless some important and promising new experiences took place in the realm of innovation policies. Probably the most important one concerns the Local Productive Arrangements (APLs is the acronym in Portuguese) in Brazil.

In 2015 it could be said that a fundamental change was taking place as social inclusion gradually found a place in the Science, Technology and Innovation agenda of the Brazilian government. Technological innovation and diffusion became relevant in the context of fostering APLs. They have been influential concerning usually neglected groups, regions and productive structures. Relevant examples include expanding popular housing by means of the program “My home, my life”. APLs have mobilized local potential in several regions of Brazil. The underlying theory, directly related with the NIS conceptualization, and the main orientations for connecting it with practice were elaborated by the academic network RedeSist, formally set up in 1997. (Cassiolato et al, 2014: 74, 75, 88; Mazzucato & Penna, 2015: 54, 55)

APLs show how groups, localities and productive tasks usually absent from Innovation Systems can get involved in innovative activities when they are effectively promoted by the “side” of the triangle determined by the State, as the articulating vertex, and academy, as the knowledge

supporting vertex.

4.d Developmental coalitions

Propositional clues stemming from the normative characterization of Sustainable Human Development as well as the NIS conceptualization for the study of interactions between technology and social relations, with its emphasis on linkages between "distributed" activities, point to the need of (new type of) convergences or coalitions of several actors.

"The success of policies to implement the 2030 Agenda for Sustainable Development and to achieve the Sustainable Development Goals will hinge on a new development pattern: a progressive structural change centred on equality and environmental sustainability and based on social coalitions and compacts for governance at the global, regional and national levels." (ECLAC, 2016: 169)

It is said that "upgrading coalitions" (Doner & Schneider, 2016) are needed to overcome the "middle income trap". Countries are caught in such trap when their production can compete neither by salary (with lower income countries) nor by learning and innovation capabilities (with high income countries). The trap is located in the upper echelons of the peripheral condition. In fact "many developing countries today are uncompetitive against a country such as China with respect to both unit labour costs and technology." (Tregenna, 2016: 723) Doner and Schneider (2016) argue that business and labor should be the core constituencies of needed coalitions which are hampered by high inequality and fragmentation of social groups.

The problem of incorporating subordinated groups can be analyzed from the point of view of the "embedded autonomy" of the developmental state:

"Kerala and Austria show that mobilization of subordinate groups can serve as a substitute for the exogenously created weakness of elites that was so important for the balance of autonomy and embeddedness in the East Asian cases. If only capital is organized, then only exceptional external events on the order of World War II are likely to allow the state to remain autonomous while at the same time connected. Multiple organized constituencies make it easier to balance embeddedness and autonomy." (Evans, 1995: 246)

In such perspective it can be added that, without incorporating subordinated groups to Innovation Systems, knowledge-based and inequality-diminishing development has a low probability, so the really important trap – which could be called the peripheral trap – is hard to overcome.

Coalitions as considered by ECLAC (2016) or Doner & Schneider (2016) need to include popular actors. But that does not ensure its proactive "upgrading" character: they can be only distributional reactive coalitions. The last happened in no small measure in the case of popular coalitions in South America. Aggregating different interests in a minimally coherent and long term collective project is supposed to be the task of political parties that want to lead the state seen as the "articulating vertex" of the core triangle in NIS. Now:

"The idea that the mobilization of subordinate groups by strong parties may provide an alternative basis for embedded autonomy will be met by skepticism in intermediate states, where electoral politics is usually associated with clientelism and the capture of the state. Parties with long-term agendas are even harder to build than state bureaucracies. Any possibility of building political organizations that are encompassing and efficacious depends first of all on finding a "joint project" that unites the state apparatus and its societal constituencies in the same way that the project of industrial transformation brought together industrial capital and the developmental state." (Evans, 1995: 246)

A "joint project" points to ideological relations. What can be today the ideological support of a project of the type under consideration? Technonationalism was part of the answer in the case of catching up projects in East Asia that as Evans says "brought together industrial capital and the developmental state", that is, the upper side of the core triangle in NIS. Nationalism has shown

strong organizational power during more than two centuries and it still does in many different contexts, most remarkably in the big powers. Technonationalism is potentially very effective since it points to combine organizational power and technological power. Several development efforts in the peripheral world during the last sixty years were inspired by (some sort of) technonationalism; but in general it was not the predominant orientation, and relevant successes seem to be concentrated in East Asia.

Coalitions or compacts for Sustainable Human Development can be termed developmental coalitions. By definition they need the ideological power that stems from democratic values: such values are centrally involved in the expansion of individual and collective capabilities and freedoms as ends and means of development. So Sustainable Human Development as an agency-based general project cannot be separated from democratization understood as empowering people. It is given substance by concrete processes countervailing distributive power. That is never easy, particularly because "distributive power derives originally from collective power, i.e. [...] stratification derives from social cooperation." (Mann, 2006: 366) Distributed power is often increased by the interactions of technology and social relations; main contemporary examples of that can be seen in how elites control the generation and use of scientific and technological knowledge. Knowledge democratization should be a central component of the project of any developmental coalition.

4.e On strategies

Articulating coalitions and carrying into practice their projects are the political and ideological tasks of elected officials, policy makers, political parties and social movements. Academic work can at best suggest some points that could be useful to take into account. This is the content of the propositional approach to development; it is of course related with public policies but should be wider aiming to be of some use for different actors while they elaborate and implement their strategies in the general context of Sustainable Human Development.

Knowledge democratization needs to be considered as a fundamental orientation for such strategies. When combined with the NIS conceptualization, it gives up most priority to the incorporation of subordinated groups to the NIS as agents of generalized learning. From such premise several suggestions follow for acting in the context of the Sabato triangle.

The triangle as such is a working model. A small example of that is the Uruguayan Extensionist Center. Academics made the original proposal. It was institutionalized as a partnership between the Ministry of Industry, the entrepreneur's Industrial Chamber and the University of the Republic. It fosters connections between potential demand of knowledge stemming from firms, especially small ones, and academic teams that can help in coping with such demand in ways that combine what different actors know.

University-industry relations is a widely studied issue. It can be seen as the usual interpretation of one of the sides of the core triangle. Sometimes, by talking about technological transfer, that side is assumed to be a one way street. Track 1 of Globelics 2017 Conference goes beyond both limitations; it is called "University relationships with industry and society: the developmental university". It includes, for example, the cooperation between academic teams and subordinated groups. By speaking of relationships and not of transference it opens the way to considering interactive learning processes, where different actors contribute with their specific knowledge and all learn while trying to jointly solve problems in new ways, also called innovating. Such type of cooperation aims at including subordinated groups in the innovation process, that is, in the definition of the problems that have to be solved, in the search for solutions, and in their implementation. Fostering that type of interactive learning processes require that academic policies and incentive systems give them real priority.

Connecting advanced knowledge with solving social problems requires also that the government connects innovation policies with usually neglected groups, regions and productive structures, as it has happened in Brazil's APLs as described above. Moreover, it requires coping with what is in

this context the most difficult problem, access and success of not privileged groups in advanced learning processes. Without that, such groups will probably be patients rather than agents in several innovation processes and often just losers. The emphasis on agency remembers that popular actors should be main protagonists in overcoming such situation. In some cases, their interests may point in such direction: "in a worker cooperative the workers are shareholders, with an interest in training workers with relevant skills." (Hodgson, 2015: 379) Usually short or medium term interests of trade unions do not give high priority to advanced permanent learning. But this is directly related with (at least long term) fundamental interests of labor: coping with unemployment, fighting the degradation of jobs, overcoming subordination and fostering human realization in work. In any case access to such type of learning is extremely difficult for people without tertiary education, that is, the overwhelming majority in subordinated groups.

Learning upgrading potentially benefits upgrading production, environmental protection, social improvement and knowledge expansion. It is a sine qua non condition for knowledge democratization and for Sustainable Human Development more generally. In the long term it benefits people in general. It should be a strategy that characterizes developmental coalitions. The problem is how to foster it in the context of contradictory interests and inherently conflictual economic, political and ideological relations. Here it must be remembered that learning takes place not only in educational institutes but also in any activity where a problem needs to be solved not by routine procedures but by doing new things. Advanced permanent learning will increasingly take place in creative working activities. When that happens, efficiency may be improved. Thus ways could be found to connect learning and working with two interrelated consequences: first, things are done better in the production of goods and services in general and particularly in public administration; second, material and spiritual interests of workers are better served.

In the quotation with which this paper starts it is asserted that: "The focus on interactive learning – a process in which agents communicate and cooperate in the creation and utilization of new economically useful knowledge – may lead to an underestimation of the conflicts over income and power connected to the innovation process." (Lundvall, 2010: 340) Conflicts and stratification will not disappear. That follows from the relation between coordination and power; Mann's theory has the following consequence: collective power requires coordination and systematic organization, while organization implies unequal distribution of power and social stratification. Democracy in a strict sense is beyond human possibilities. But history shows that democratization is feasible.

Democratization in general means increasing collective power of subordinated groups and decreasing distributive power. That really happens in some contexts and through some ways of articulating interests in coordinated activities. What is called political democracy refers to some levels of democratization of political power that, in a historical comparison, are relatively high. They are far from perfect (in any sense of the word) and also contingent: they need to be protected. Protecting democracy in one realm requires both deepening and widening it; specifically, protecting political democracy requires both promoting political democratization and connecting it with democratization in other realms. Concentration of knowledge (which could also be called knowledge de-democratization) threatens political democracy, for example, via the expansion of plutocracy, while the last implies conversely that the benefits of knowledge (in health for example) become more concentrated. But things can turn the other way round: political democratization and knowledge democratization can help each other. In any case, it is increasingly difficult that one takes place without the other.

Linking political democratization with knowledge democratization should be a priority for progressive political parties and governments. It is a typical task of what above was called the articulating vertex of the core triangle of the NIS. A democratic project in the XXI century requires articulating claims and efforts of popular actors in such ways that they back, and are backed by, generalizing advanced learning connected with productive work, expanding research and innovation closely related with social priorities.

Conclusion

Globelics 2017 call for papers says that: "The main conference theme for Globelics 2017 is innovation and capacity building in the context of financialization and uneven development of the global economy: new roles for the state, productive sector, and social actors." Uneven development is rooted in power inequality. Both are fostered by financialization and prevailing innovation policies. Sustainable Human Development requires alternative strategies. A primary analysis of the interactions between technological power and organizational power suggests that alternative strategies should include knowledge democratization in the context of innovation systems. That is one of the new roles that the state, productive sector, and social actors must integrate in a joint project. If that is so, NIS academics can be of some help not only to policy makers and production experts but also to popular actors.

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