

# **Socialism and Innovation**

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## 1. Introduction

Several new models of a socialist economy have been proposed during the past fifteen years which seek to combine three principles: economic planning rather than market forces guides economic activity, democracy characterizes political and economic institutions, and wide participation in decision-making is fostered. Such models of what can be called democratic planned participatory socialism (DPPS) have been developed by Devine (1988), Albert and Hahnel (1991), and Cockshott and Cottrell (1993).

This literature has emphasized the potential superiority of DPPS over other systems at meeting human needs. However, the claim of superiority for DPPS has been typically cast in a static framework. The literature has largely overlooked the expected performance of a DPPS system in the most important dynamic aspect of economic life: technical change and the process which brings it about – innovation.<sup>1</sup>

The potential innovation performance of DPPS is important for evaluating the viability of such a system. DPPS might live up to the full expectations of its proponents in the way that it uses currently available resources and technologies to meet human needs, but if it proved technologically stagnant, it would not be likely to survive. One reason is that a future DPPS system will have to compete for some time with a rival capitalist system, which we know to promote rapid innovation.<sup>2</sup> Even apart from a rivalry with capitalism, a significant rate of technical progress will be essential to human welfare for some time to come.

This paper analyses the expected innovation performance of a DPPS system in comparison to other systems. Section 2 presents a framework for analyzing the innovation process in general. Section 3 briefly comments on the innovation performance of contemporary

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<sup>1</sup> A recent exception is Devine (forthcoming), which considers innovation in relation to entrepreneurial activity in a DPPS system.

<sup>2</sup> One can argue that the rate and direction of innovation under contemporary capitalism are “too revolutionary,” as a result of social deficiencies with the profit motivation for innovative activity.

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capitalism. Section 4 considers the innovation experience under state socialism, specifically for the Soviet case. Section 5 takes up directly the expected innovation performance of a system of DPPS. Devine's (1988) version will be used as the template for discussing innovation under DPPS, although the analysis should be applicable, to a greater or lesser extent, to other models of DPPS as well.

## **2. The Innovation Process**

In the literature on innovation,<sup>3</sup> two types are usually distinguished, process innovation and product innovation. The innovation process can be broken down into four stages: invention, development, production, and diffusion.<sup>4</sup> Invention here means originating the idea for a new product or process and working it out in rudimentary form. Development involves turning the rudimentary form into an economically viable product or process, capable of being produced/introduced within the existing economic system. Production is the step of actually first producing the new product or introducing the new production process. Diffusion is the spread of the new product to other producers or the new process to other users.<sup>5</sup>

Invention, as defined above, is a very risky endeavor, since most new ideas do not pan out. However, invention is not necessarily very costly. Development, while also risky, is much less so than invention. However, the difficulty of converting a rudimentary form into an economically viable product or process makes this stage typically time-consuming and costly. First production/introduction is less risky still, and the cost varies considerably depending on the

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<sup>3</sup> Neoclassical economics has little useful to say about innovation, with its static focus and the assumption that technology is exogenously determined. The best work on innovation has come from the margins of mainstream Western economics.

<sup>4</sup> See Scherer (1980, ch. 15).

<sup>5</sup> Basic scientific research, while not part of the innovation process proper, forms a crucial basis for it. However, it is omitted from our analysis here. The institutional form and nature of funding sources for basic science, which is primarily a non-commercial endeavor, have been relatively similar in capitalism and state socialism and are not likely to differ greatly in a prospective future DPPS system. The key debate is over the capacity of alternative systems to effectively handle the innovation process proper.

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case. In the final stage of innovation -- diffusion -- the only remaining risks are commercial, not technical.

The above stages schema is helpful for analyzing how hospitable a particular institutional framework is to innovation. A system must be favorable for all stages of the innovation process if it is to exhibit good performance. To approach this analysis, we can ask three questions about a system:

1. Does the system provide strong incentives for innovation?
2. Does the system provide substantial means to carry out innovation?
3. Does the system generate innovative effort that contributes effectively to the improvement of human welfare?

The above three questions can be applied to an analysis of innovation under contemporary capitalism, under the now defunct system of state socialism, and in a future system of DPPS.

### **3. Capitalist Innovation**

Mainstream Western economics gives capitalism high marks for innovation. The pursuit of profit is supposed to assure a strong incentive to engage in the invention, development, and production stages of innovation, while also inducing investors to provide potential innovators with the necessary financial means. Free entry into markets compels rapid diffusion of innovations. An optimal contribution to human welfare is assured, given the assumption that profitability reflects the ultimate value to society of any economic activity.

While capitalism does promote a certain kind of rapid technological change, the above account has serious flaws. The pursuit of profit does not play such a big role at the important invention stage of innovation. Studies show that a large majority of economically important inventions come from university scientists, government researchers, and independent inventors, for whom pecuniary considerations are not typically dominant.<sup>6</sup> At the development stage, the

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<sup>6</sup> The classic study covered 70 economically important inventions since 1900 (Jewkes et al., 1969). It found only 24 originated in industrial research laboratories, while over half came from

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still-high risks, plus the sometimes substantial external (and hence uncapturable) benefits from innovation, lead to (successful) demands for government subsidization.<sup>7</sup>

The profit incentive for innovation is profoundly contradictory. For the profit incentive to operate, innovators must be able to gain monopoly control over the innovation and bar competitors, or else the first innovator's profit will be small and fleeting. However, the legal and extra-legal means that capitalist innovators use to gain such monopoly power (patents and predatory tactics) prevent the rapid diffusion of new products and processes.

The greatest flaw in the capitalist innovation process has to do with the third question, that of the contribution of innovative activity to human welfare. As capitalist innovators follow the guide of profits, the following problems arise: 1) innovations are disproportionately directed at upper income consumers;<sup>8</sup> 2) public goods are largely ignored in the innovation process; 3) external benefits and costs of innovation, which may loom very large, are not taken into account in innovation decisions; 4) the monopoly power required to stimulate innovation leads to high monopoly prices for the resulting product, limiting the use of the new innovation and hence reducing the benefit from it;<sup>9</sup> 5) much innovation activity is pure waste, as firms devote innovation resources toward the end of defeating rivals rather than benefitting consumers.<sup>10</sup>

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either independent inventors or academic scientists. Other studies have found a similar pattern (Scherer, 1980, 416-17).

<sup>7</sup> In the US in 1993, the federal government supplied 28 percent of total government and industry outlays for development. Government financed 38 percent of all R&D spending that year, including scientific research (Scherer, 1999, pp. 56, 81).

<sup>8</sup> For example, U.S. pharmaceutical companies do virtually no research aimed at developing new drugs to cure diseases such as tuberculosis and malaria, which kill tens of millions of (low-income) people every year in the Third World. They find research on new remedies for acne or toenail fungus, which can be sold to high-income consumers, much more lucrative.

<sup>9</sup> Pfizer's patented drug fluconazole, which cures cryptococcal meningitis, a deadly side-effect of AIDS, sells for \$18 a pill, placing it beyond the reach of AIDS sufferers in Africa. A generic version produced in Thailand, outside the reach of Pfizer's patent, costs 60 cents a pill (*New York Times*, July 9, 2000, 8).

<sup>10</sup> Examples are Microsoft's decision to bundle its internet browser into the Windows operating

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While capitalism does promote the development of the forces of production, it does so in a manner that is severely flawed. Capitalism can promote innovation only if the state and other non-capitalist institutions play an active role in organizing and financing the innovation process, particularly the invention stage. It can do so only with significant monopoly power and barriers to entry that simultaneously promote and hinder technical progress. And it produces a severely distorted innovation process that, after a certain stage of development, may subtract as much from human welfare as it contributes, or even more.

#### **4. Innovation under Soviet State Socialism**

The Soviet system was, at best, a highly flawed and distorted version of socialism. However, it was the first large-scale effort to build a modern economy based on public ownership of productive property and coordination of the economy by economic planning. For this reason, the experience of the Soviet economy in the area of innovation is relevant to our concerns here.

Spokespeople for the Soviet system claimed that, as a socialist system, it would, and did, outperform capitalism in promoting technical progress. The key advantages cited were the absence of commercial secrecy, the avoidance of the wasteful duplication of R&D effort of capitalism, and the ability to directly incorporate technological advances into the central plan rather than having to rely on the indirect incentive of profitability. However, the Soviet leadership soon discovered that innovation was not as straightforward a process as had been assumed. In the postwar decades the system was frequently adjusted and reformed to improve innovation performance.

The mature Soviet system had various institutional components to its innovation system, including the incorporation of major planned new technologies into the central plan by Gosplan each year. However, two institutions were most important in Soviet innovation performance: 1) a

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system and the pharmaceutical companies' pursuit of "congeners," which are minor molecular variations of existing drugs that can be separately patented despite having no advantage over the original drug.

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system of R&D Institutes, which had innovation as their sole mission; and 2) the individual enterprises, which typically had a design department for new product development and, at larger enterprises, a research laboratory.

The Soviet system did have significant strengths in innovation performance.<sup>11</sup> Soviet R&D Institutes were staffed with well-trained and dedicated researchers and were reasonably well funded, and they and the enterprises did produce many important innovations. The success was best known in military and space technology, but it extended to some civilian industrial technologies.<sup>12</sup> Output per labor hour in the Soviet economy grew rapidly until 1975, much faster than in the U.S. during that period (Kotz and Weir, 1997, p. 46). However, Soviet innovation performance never lived up to expectations. Understanding the problems encountered in the Soviet innovation process -- and the institutional sources of those problems -- is relevant to evaluating the potential innovation performance of a DPPS system, including potential problems that it might encounter.

There was a serious incentive problem in the Soviet innovation process. The incentive problem was not located at the R&D Institutes but rather at the enterprises. Soviet enterprises were relatively good at minor innovations. The incentive problem involved larger changes in the production process and the development of new products that differed substantially from what had been produced before. The Soviet enterprise director faced a context of relatively low rewards (in the director's bonus) for successful innovations while the risks attendant upon major innovations were quite high. This tended to make Soviet enterprise directors conservative about innovation, with reluctance to develop new products or processes or to introduce those that emerged from the R&D Institutes.

The risk of innovation was not just the result of the inevitable delays and unforeseen costs

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<sup>11</sup> This section draws on the pathbreaking research of Joseph Berliner on innovation in Soviet industry (Berliner, 1976, 1981).

<sup>12</sup> For example, the Soviet Union was at the world technological frontier by the 1970s in eye surgery equipment, seamless rail laying machines, and certain metallurgical processes.

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that arise when trying something new. The key factor was the difficult supply relations in the Soviet planning system. Enterprises always worried about whether sufficient supplies would be delivered on time to enable the enterprise to meet its goals. This was a result of the policy of “taut planning,” aimed at achieving the maximum possible output from available inputs. Innovation necessitates unforeseen changes in required inputs, and the taut planning system made it difficult to change the input mix in mid-plan. The hierarchical relations of Soviet planning meant that enterprises did not have close relations with their suppliers, which compounded the problem. These conditions made innovation very risky, with a likelihood of interruption of the enterprise’s regular production, resulting in financial punishment for the director.

Another incentive problem was an absence of penalties for failure to introduce available new technologies. A laggard enterprise with outmoded technology might find its costs rising above the industry average, but the ministry tended to protect its enterprises and made subsidies available.

There were also problems of the means available for innovation. Innovations that involve radically new products typically entail either the entry by an existing enterprise into a new line of production or the creation of new enterprises. The Soviet planning system had relatively rigid boundaries between industries, and entry into a different line by an existing enterprise was discouraged, as poaching on the territory of others.<sup>13</sup> While new enterprises were created from time to time, this was limited and usually faced opposition from existing enterprises.

Individual inventors were greatly underutilized in the Soviet system. Most enterprises had an official policy of making small-scale facilities available to aspiring inventors. However, this program was not very effective at drawing out creative individual inventors, perhaps because the passivity bred into individuals by the repressive, centralized, hierarchical Soviet system

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<sup>13</sup> An exception applied to enterprises undertaking the production of their own inputs for their own use.



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discouraged individual inventive activity.

In the matter of the effectiveness of innovative activity at advancing human welfare, the Soviet system did avoid some of the problems of capitalist innovation. There was no bias against innovation in public goods. There was no problem of monopoly pricing of new products and processes, with the attendant limitation of their use.

However, the Soviet system had significant weaknesses in the effectiveness of innovative activity. We will cite three problems in this area. First, while irrational profit criteria largely guide the allocation of innovative effort in a capitalist system, in the Soviet system the “planners’ preference” guided this allocation. The top leadership favored certain sectors, particularly the military, space exploration, and certain industrial sectors, while consumer goods occupied a lowly place in their priorities.

Second, there was a problem stemming from the poor relations between the two key institutions involved in innovation, the R&D Institutes and the enterprises. The R&D Institutes had the best researchers and facilities, and they produced a large volume of plans for new products and processes. However, the enterprises, which had to produce the new product or introduce the new process, complained that plans arrived that were incomplete, unrealistic, or unworkable. R&D Institutes complained that enterprises were uninterested in their proposals. The result was that much innovative effort failed to bear fruit. This seemed to be a result of the hierarchical character of the system, in which relations between institutions at the same level of the hierarchy were very poorly structured.<sup>14</sup>

Third, and perhaps most serious, innovation in the Soviet system generated major external costs, particularly for workplace and environmental health. The reason for this in the Soviet case was not the pursuit of profit but the single-minded emphasis on growth in output and

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<sup>14</sup> The problem of poor working relations among institutions participating in the innovation process can be viewed as creating obstacles to effective utilization of what the Austrian school calls “tacit knowledge.” Such tacit, or non-explicit, knowledge plays an important role in innovation (Devine, forthcoming).

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the undemocratic and repressive character of the system which prevented the affected parties from defending their health interests.

### **5. Innovation in a Democratic Planned Participatory Socialist System**

What kind of innovation performance would be expected under a DPPS system, by comparison to that of capitalism and state socialism? Three features of DPPS, as laid out in Devine (1988), are relevant to innovation performance. First, the main features of the overall economic plan would be determined by a democratic process (Devine, 1988, p. 190).

Second, the planning and coordination of the economy would take place, not through market forces or top-down central planning, but through a process of “negotiated coordination” (Devine, 1988, ch. 8-10). This means that resource allocation decisions would be made by boards -- industry boards and local and regional negotiated coordination bodies -- that have representation of all affected constituencies, including workers, consumers, suppliers, the local community, and even “cause” groups such as environmentalists, job safety activists, feminists, etc. These bodies would arrive at decisions through compromise among the interests represented on them. In addition, the basic units of social production, or enterprises, are considered social property and have governing boards that include representatives of all groups affected by the activity of the enterprise, including workers, consumers, suppliers, and the local community.

Third, each individual would be expected to spend part of her/his work life in each of the main types of labor, which Devine defines as planning and managing labor, creative labor, nurturing labor, skilled labor, and unskilled/repetitive labor (Devine, 1988, 171). This would eliminate the social division of labor, while preserving the technical division of labor with its efficiency advantages.

In the absence of competitive pursuit of profits, or a Politburo demanding innovation, what would be the source of innovation under DPPS? First, the democratic, participatory institutions of that system would empower the population to demand innovations aimed at its own benefit. Under such a system, people would stand to benefit from innovation, in the three roles that people occupy – that of consumer, worker, and community member. Consumers can

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benefit from new, better, and cheaper products. Workers can benefit from less arduous toil and a more satisfying experience at work. Members of the community can benefit from products and work processes that improve, rather than harm, community life.

DPPS, like every economic system, can also tap a second potential source of innovation. That is the species trait of human beings of having a propensity to look for ways to change and improve their methods of doing things, entirely apart from any desire for more goods or less labor. This drive, present in most people, although not in equal measure in all, represents an important source of innovative behavior at the stage of invention, if the economic system allows it to operate freely.

How would a DPPS economy translate the potential benefits of innovation into actual effective innovative activity? How would it encourage, within the economy, the expression of human beings' natural tendency to create new things?

If the populace wants innovation, they would have to build into the system significant incentives for those who are in a position to carry it out. Enterprise managers, along with everyone else who participates in any of the stages of innovation, should be eligible for rewards for successful innovation. It is not sufficient to assume that decision-makers will automatically innovate -- it must be communicated to them, via a reward system, that society values innovation. Such rewards would be needed regardless of the mix of material versus moral incentives. Pay incentives need not be huge to elicit innovative behavior, as long they are large enough to bring a noticeable consumption benefit to the innovator.

As the Soviet experience indicates, a planned economy can increase the risk associated with innovation, deterring innovative activity. However, DPPS should not suffer from the problems of uncertain supplies and inflexibility that characterized Soviet planning. With representatives on one another's decision-making boards and with opportunities to communicate on negotiated coordination bodies, there should be reliable and flexible relations between suppliers and customers. It would be necessary to eschew the Soviet policy of taut planning and operate the economy with sufficient excess productive capacity to accommodate the unforeseen

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changes in inputs that innovation requires.

Without the spur of competition to compel laggard enterprises to adopt the best technology in the industry, could an enterprise management, perhaps backed up by a workforce unenthusiastic about change, simply refuse to make improvements? As was noted above, an enterprise under DPPS is not the sole property of its workers but is social property, upon which constituencies outside the enterprise have a legitimate claim. Industry boards would have to keep track of laggard enterprises, and consumer representatives on both industry and enterprise boards would have to be powerful enough to exert pressure to make appropriate changes, imposing financial penalties where necessary.

In order for this system to work effectively, it would be desirable to have more than one enterprise in each industry, except in cases of natural monopoly.<sup>15</sup> The purpose is not to impose a market form of competition in which the cheapest producer drives out the rest, a process which often yields socially irrational outcomes. Rather, the purpose is to permit the gathering of comparative information about enterprise performance, from market exchange as well as other sources, so as to make informed decisions about what changes enterprises should be asked to make. It would not always turn out that the higher-cost producer is the one asked to change; the lower-cost producer might be found to have achieved low costs by anti-social practices rather than superior technology.

Long ago Adam Smith complained that the detailed division of labor tends to make workers stupid. The DPPS practice of assuring everyone participation in the highest types of labor should have the opposite effect. This practice, along with the widespread participation in decision-making fostered by a DPPS society, should encourage the creative, innovative behavior that is natural to our species. DPPS should create conditions for a substantial outpouring of creativity from the population, some of which would take the form of innovation in the economic sphere.

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<sup>15</sup> Devine (1988, 220) makes a similar argument.

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In the matter of assuring adequate means for innovation, DPPS would face a serious problem. The basic institutions of DPPS would not necessarily provide sufficient opportunities for creative individuals to work out new economically relevant ideas. More generally, there would be a danger that the decision-making boards of DPPS would tend to represent existing ways of doing things and offer resistance to innovation.

The citizens of a DPPS society could solve this problem by establishing an Innovation Facilitation Board (IFB), dedicated to the promotion of innovation throughout the economy.<sup>16</sup> The IFB would be given substantial financing from the central treasury. It would take applications from enterprises, informal groups, or individuals that wanted to work on inventing a new product or process or to engage in the development stage of an innovation. It would be able to make grants covering a long enough time period to provide a chance of success.

Determining the membership of the IFB represents a serious problem for DPPS. If the IFB included representatives of all the constituencies that are affected by innovation, this would be likely to subvert its intended function. Major innovations typically have victims, and the potential costs may be more apparent than the potential benefits when the innovation is still at an early stage.<sup>17</sup> A simple application of the principle of wide representation might block the development of new products and processes before their potential benefits became apparent.

In order to be capable of carrying out its mandate, the IFB would have to be constituted as an independent board, perhaps made up of consumer representatives and experts of various kinds. Such a departure from the usual practice would be consistent with the underlying principle of DPPS, as long as the final decision to implement an innovation rested with a representative board. The IFB would facilitate and encourage the invention and development stages for new

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<sup>16</sup> The IFB would not necessarily be a single body but would likely have a structure including regional and local boards and possibly boards that specialized in particular kinds of innovations.

<sup>17</sup> Worker (or industrial) members might resist new ideas that seemed to threaten the product or process to which they were currently connected. Regional representatives might object to innovations that would appear to undermine the current economic base of their region.

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products and processes. It seems justified to protect the early stages of innovation from a final social decision, until it has been developed to the point where a well-informed judgment can be made about benefits and costs.

However, the decision to implement an innovation should have to pass the test of the system's core process of evaluation by, and compromise among, all affected constituencies. This calls for a second institution, an Innovation Approval Board (IAB). It would be constituted in the usual way, with representation of all relevant interests. Its role would be to determine whether a proposed new product or process, which emerged from a grant from the IFB, should be given the green light for production/introduction.

While contemporary capitalism does place some after-the-fact restraints on socially harmful innovation, through state regulation and individual or class-action lawsuits, DPPS would place social interests at the heart of the innovation process. While the research and development stages of a potentially harmful project could not be readily blocked by opponents, the project could not be implemented, and the costs actually imposed, without social approval. Furthermore, those engaging in invention or development on an IFB grant would know the criteria by which the implementation of the innovation would eventually be judged by the IAB, which should have a positive impact on the direction of invention and development.

A remaining problem is the possible need to allow an existing enterprise to enter a new line of production, or to permit the founding of a new enterprise, in order to implement a major innovation. This might encounter resistance from existing interests. To avoid this problem, once the IAB has given its approval, the innovators should have the right to request permission to start a new enterprise, or enlist an existing enterprise to move outside its previous line of work, in order to implement the innovation. A decision to grant such a request might require a joint meeting of the IFB and the IAB.

The social effectiveness of innovation under DPPS should be free of each of the five problems of capitalist innovation cited above. Innovation would not be directed disproportionately to satisfy the rich, since there would be no rich class, nor would profits from

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sale guide innovation. The balance between innovation in public and private goods should reflect the citizenry's priorities, since representative bodies would allocate innovation resources between the two types of goods, and the incentives for innovation should operate equally for the two. External benefits and costs, including those affecting workers and the environment, should be fully considered by the representative boards that make decisions about the introduction of new technologies and products. Such decisions would not face the pressure to impose costs on third parties that results from competitive profit-seeking. There would be no problem of monopoly pricing restricting the application of innovations and no waste of innovative effort due to oligopolistic competition.

The three problems that undermined the effectiveness of innovation under state socialist planning should be absent from DPPS. No Politburo officials would dictate priorities for innovation. Instead, democratic decision-making would determine the amount and allocation of innovation. The waste-generating disconnection between R&D Institutes and enterprises should not be present in DPPS, since horizontal relations among institutions would be strong. If R&D Institutes were designed as part of the innovation system of DPPS, then cross representation between them and the enterprises should permit an effective interface between the two types of institutions. Last, the causes of the severe external costs of innovation under state socialism – a single-minded focus on growth of output and a lack of democracy – should not characterize DPPS.

Our conclusion is that the basic defining institutions of DPPS are generally favorable for innovation, but these institutions alone would not be sufficient to guarantee successful innovation performance. By adding the set of additional institutions and policies mentioned above, DPPS should display an innovation performance far superior at meeting human needs to that of either capitalism or state socialism. Of course, such a system would not guarantee that every innovation would contribute to human welfare. It is not always possible to predict in advance what the eventual consequences of a new product or process will be. However, such a system would be far superior to earlier systems at making such decisions.

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It is uncertain whether human society will always engage in rapid innovation. If a future advanced DPPS some day achieves a comfortable living standard, satisfying work of limited duration, and the economic supports necessary for a fulfilling community life for all, then its citizens might decide that they prefer a stable, sustainable economic level without continuing change in economic life. At that point, the human creative impulse might turn entirely to non-economic pursuits. However, such a choice would not be likely as long as pockets of poverty and material deprivation persist, nor would it be feasible as long as DPPS is compelled to compete with capitalism.



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