

Reassessing Oscar Lange's Insights on AI and Labor Relations in Modern Capitalism

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Abstract: The work examines Oscar Lange's cybernetic economic theory in the context of modern advancements in artificial intelligence and its socio-economic implications. It focuses on Lange's vision of integrating computer simulations into socialist economic planning to enhance efficiency and democracy, contrasting this with current AI development under capitalism. The research investigates how AI technologies today align with Lange's theoretical predictions, while also highlighting the divergence toward crises such as cyber-feudalism, dehumanization, and economic inequality. Using comparative analysis, theoretical deduction, and historical data reviews, the paper discusses AI's potential benefits and challenges in productivity and production relations. It examines whether future historical developments will align with cyber-feudal dystopias or post-scarcity utopias. Such study concludes that although Lange's vision was constrained by technical and political challenges of his time, AI has partially validated the potential of computer-assisted economic planning. However, instead of advancing socialism, AI has deepened capitalist contradictions. At this intersection of technological progress and social upheaval, the paper emphasizes the importance of embedding ethical frameworks, such as Lange's socialist principles, into AI systems to mitigate inequality and alienation. It suggests that responsible technological development can offer a path toward a more humane and equitable future, but continuous observation and critical analysis are required to align technology with human needs. This study acknowledges its limitations in focusing primarily on Lange's theoretical frameworks without comprehensive empirical data on AI's impact across industries. Future research should integrate quantitative analyses and qualitative studies to further understand AI's effects on labor markets and social inequalities.

Keywords: Oscar Lange, artificial intelligence, cybernetic economy, socialist theory, labor dynamics.

1. Introduction

With the collapse of the Soviet Union and the disintegration of the international communist movement, capitalism appears to be the most optimal production relationship for contemporary humanity [1]. However, the economic crises triggered by the rise of artificial intelligence and the limitless productivity it offers are shaking the legitimacy of capitalism. The progress driven by AI seems poised to push human society into a new stage. Information-based management has reduced the need for large clerical teams by streamlining tasks. Automated factories are generating higher

profits but also displacing workers in the process. Meanwhile, deep learning programs' ability to mimic creative work suggests the irreversible shift toward replacing intellectual labor.

In this period of rapid transformation, contemporary philosophers and economists, such as Slavoj Žižek and Daron Acemoglu, have speculated about the future impact of AI on humanity based on its unique characteristics. However, as early as the 1950s, Oscar Lange, a Polish economist from the Cold War-era socialist bloc, had already theorized how computer systems could influence and control production, further transforming human society. In this context, revisiting the economic theories of Oscar Lange offers a compelling opportunity to explore alternative socio-economic frameworks. Lange's early insights on the use of computer systems in managing production, developed in a socialist context, may provide valuable perspectives for understanding how AI could lead to a new stage of human development—perhaps even toward an AI-driven socialism.

This paper employs theoretical analysis, drawing from economic theories and literature, to delve into the core of Oscar Lange's economic thought and examine the critiques it has faced within theoretical and technical domains. The objective is to evaluate the potential positive and negative implications of Lange's ideas, particularly in relation to understanding artificial intelligence (AI), its role in enhancing productivity, and its influence on shifting production relations. Additionally, this study aims to assess the relevance of Lange's theory in contemporary society. Finally, the paper will consider possible future historical developments, questioning whether society might evolve toward a cyber-feudal dystopia or a post-scarcity utopia.

2. Oscar Lange's economic theory introduction

Oscar Lange, a Polish economist during the Cold War, developed a theory under the socialist perspective that integrated computer science into market simulation and collaboration. He sought to create a cybernetic path that would grant grassroots democracy. Unlike Anatoly Kitov, who fully supported computer control of the market, and Friedrich Hayek, a free-market advocate, Lange's cybernetic approach aimed to combine the strengths of both market mechanisms and computer calculations within a new definition. According to his article "The Computer and the Market," Lange explained that the market simulates an electronic analog computer: "The electronic computer can be applied for prognostication purposes, but the computed forecasts have later to be confirmed by the actual working of the market [2]. Lange highlighted the commonalities between computers and markets in value calculation—computers use equations, while the market operates through supply and demand. He proposed using a central computer to simulate market processes, enabling the development of more effective economic plans based on forecasts.

Additionally, Lange also argued that a computer-controlled economy could avoid the shortcomings of the market: "The market is a cumbersome and slow-working servomechanism, but the computer response to requirements quickly by calculating shadow prices" [3]. In Lange's view, compared to the value conclusions reached through the slow iterative process of market competition, computer simulations of the market are much faster. Unlike the short-sighted nature of the market, the state can simulate the prices of consumer goods, and the calculated shadow prices can be used for long-term economic planning, concentrating resources on key projects while avoiding the inefficiencies caused by market self-regulation.

Furthermore, Lange's vision of a cybernetic economy was not akin to Stalinist bureaucratic centralism. In his 1957 discussion on the "Polish Socialist Economic Model," Lange argued for combining central planning with as much decentralized management as possible: "The central planning and direction of the national economy should be combined with as workers' self-management community and central planning" [3]. Such an idea distinguished Lange's ideas from Tito's Yugoslavian worker-controlled economy and Stalin's command economy. Lange leaned more toward Lenin's economic thought: socialism equals "Soviets plus electrification." In Lange's context,

Soviets represented grassroots democratic commune units responsible for resource allocation, while electrification symbolized the central role of computer planning and calculations guiding the national economy. Through central regulation and grassroots decentralization, Lange sought to reduce class division and inequality in resource distribution. Lange's theory generally tends to fellfield the high efficiency economy based on proletariat democracy though the advanced computer market simulation and combination and central plan with local organic communities.

In summary, Lange's innovative theory proposed a cybernetic economy that integrated computer simulations with socialist principles, aiming to enhance economic efficiency and democratize resource allocation while avoiding the pitfalls of traditional market mechanisms.

3. Practical and Theoretical Criticisms of Lange's Vision

Oscar Lange's discussion on the role of computer technology in developing a socialist economy encountered significant challenges in both practical theory and technology. The political environment in the Eastern European bloc was not conducive to effectively implementing cybernetics, resulting in the failure of its experiments. As critics described: "Various Soviet bureaucrats did not wish to see a computer taken their high position in their bureaucracy" [4]. The OGAS project, promoted during the Brezhnev era, which was strongly influenced by the cybernetic principles of a planned economy, aimed to electronically integrate Soviet state-owned enterprises to improve administrative and economic efficiency. However, it collapsed due to bureaucratic inertia and the rigid administrative structure. As a result, the combination of a computer-planned system with grassroots democratic community distribution, as envisioned by Lange, lacked the practical foundation for implementation in its historical context.

Theoretically, increasing voices began to question the technical and economic feasibility of computer-based control models. According to the "central planning's computation problem" critique: "for all conceivable good list is uncountably infinite which even computer could not solve." [5] Since planned economies could only regulate production and supply for known goods, they could not quickly classify or predict the economic value of a large number of potential or newly emerged goods. The administrative system often needed to update the economic model, making the entire structure cumbersome and delayed. Therefore, Lange's idea of calculating "shadow prices" using computers was one-sided; it could only forecast value trends for known goods, while the iterative competition and interaction between potential and existing goods, which also affect value, were not considered in his system.

Technically, modern computational capabilities were insufficient to simulate the market at a more micro level. Experimental simulations demonstrated this impossibility: "Due to the current computer power, the system requires 480 trillion equations to solve. To deal with these equations, it would take the Top500 supercomputers 10.5 quintillion years" [5]. Due to the limitations of contemporary computing power, it was impossible to digitally distribute consumer goods to a large population, at least not in the "results in a second" fashion Lange envisioned. Moreover, due to the heterogeneity of consumer preferences and goods, the calculations needed for distribution would be even more complex than the above simulations suggested. Therefore, Lange's concept of using computers to calculate "shadow prices" was limited because it focused only on forecasting value trends for existing goods. It did not account for the iterative competition and interactions between potential and existing goods, which also influence value.

From a technical standpoint, the computational power available at the time was inadequate for simulating the market on a micro level. Experimental simulations highlighted this limitation: solving the necessary 480 trillion equations would take the top 500 supercomputers approximately 10.5 quintillion years. Consequently, the constraints of modern computing made it impossible to digitally distribute consumer goods to a large population in the rapid manner Lange had envisioned.

Moreover, due to the heterogeneity of consumer preferences and goods, the calculations needed for distribution would be even more complex than the above simulations suggested. Therefore, an economy governed by computers could not predict economic changes and intervene in distribution at a micro level. It could only provide rough forecasts and plans at a macro level. In summary, Oscar Lange's theory was challenged by unsuccessful soviet experiment, Marginal utility theory, and the limitation of computer power.

4. AI and the Modern Validation of Lange's Theories

By the 21st century, with the continuous advancement of artificial intelligence, Oscar Lange's economic ideas have been increasingly validated in the field of technology. However, ideologically, they diverged significantly from his original vision. Today, AI can automate the distribution of goods and the collection of labor resources, continuously modeling the economy, yet it remains within the framework of capitalism, bringing with it related risks. On a technical level, the revolutionary impact of AI on the CEP (Complex Event Processing) process responds to Lange's ideas about the role of computers in the economy. A study on Centralized Economic Planning (CEP) noted that a large society of independent producers could be coordinated by a Central Processing System, with each producer owning the means of production for final commodities [6]. This concept aligns closely with Marx's vision of the "Association of Freely Associating Producers." In practice, the integration of AI in labor and the distribution of means of production has already been implemented in large companies. This technological advancement not only surpassed earlier pessimistic forecasts but also reflected Lange's idea of merging centralized computer management with decentralized grassroots labor units. Additionally, AI has immeasurable potential in evaluating and simulating market value. However, Lange's prediction, while successful on a technical level, has actually undermined his socialist teleology.

The organic integration of contemporary capitalism with AI is not leading society towards a communist utopia but towards a new state of disorder, intensifying social contradictions and pushing towards a post-human trend driven by profit-seeking. The article "Artificial Intelligence, Value Creation, and the Crisis of Capitalism" emphasizes the contradictions inherent in AI-driven value creation within the social production system. Capitalists implement AI in production processes to enhance efficiency and maximize surplus value, with the primary aim of transferring goods to consumers, especially industrial workers. However, this shift toward intelligent production also results in widespread unemployment and impoverishment among these workers, ultimately diminishing their ability to make purchases or engage in consumption. In the capitalist system, AI continues as an extension of private means of production, just as large-scale machinery disrupted workers' livelihoods during the Industrial Revolution of the 18th and 19th centuries. As AI increasingly replaces both mental and physical labor, the accumulation of wealth in private hands lays the foundation for further class division.

Moreover, the modern digital economy breakthrough the traditional Employment Relationship, made the capitalist forms of oppression towards to self-exploitation. As Slavoj Žižek remarked in his essay "Capitalism Destroyed Itself, and What is Digital Feudalism", "classic capitalism' no longer exists, and the classic 'exploited' are becoming fewer [7]. More and more people are voluntarily creating 'digital capital' for these 'digital feudal lords'." Today, the monopolistic control of the digital economy and AI by a few oligarchs is gradually destroying the personal sovereignty most valued by liberalism. People now project their lives entirely onto digital platforms, voluntarily providing data that AI systems use to optimize the profits of large corporations, thus intensifying their own exploitation through self-enslavement. The disappearance of the opposition between labor and life in the digital age represents a doubling of human alienation under modern capitalism. This process of self-enslavement under digital feudalism, and the class division exacerbated by AI, is far from

Lange's vision of proletarian democracy and liberation under cybernetic socialism. Technology has not been utilized by socialists, as Marx predicted, to bring about proletarian liberation through advanced productive forces. Instead, it has become an integral part of modern capitalism, developing its own order further.

The development of AI within the capitalist framework is gradually destroying the previous human-centered planning. As described in "Inhuman Power", "Biological corporeality, inefficient and insufficient for valorization at machinic speed, would become an obstacle for capital to overcome" [8]. Just as Lange pointed out the similarities between the market and computers in value prediction, there are also commonalities between AI's iterative and learning mechanisms and the development of capitalism. Through their shared expansionary mechanisms, the fusion of AI and capitalism may, in the future, replace human elites—namely, the capitalists and rulers. In contrast to socialism's ultimate goal of freeing humanity from labor, this future would see AI liberating the means of production while humanity would face a choice: further dehumanization through fusion with AI or gradual extinction. Marx's human-centered framework and trajectory of historical development will no longer apply in a future where AI controls the course of human evolution.

5. Discussion

Oscar Lange, during the 20th-century international communist movement, proposed using computer simulations to assist the market and predict the shadow prices of goods, thereby helping the state formulate long-term economic plans. He envisioned a path toward moderate socialism by combining central computational regulation with the distribution by grassroots democratic communes. Although his theories were challenged both practically and theoretically during the Cold War, the rapid development of artificial intelligence in modern times has shown that technological advancements validate Lange's forward-thinking ideas. However, the cybernetics emerging within the capitalist framework today differs drastically from his socialist teleology, with the former suggesting a future of increased dehumanization and exploitation. Despite these challenges, Oscar Lange's ideas still hold significant guiding value. His concept of simulating the market and predicting the value of goods aligns with how large corporations today use AI to regulate and forecast production, offering theoretical insights into current practices. More importantly, Lange's idea of proletarian power within the economic model, which envisioned accounting and distribution units based on democratic communes, is crucial in the context of today's growing class divisions exacerbated by digital feudalism and AI. By emphasizing the need for workers to unite through autonomous organizations and the struggle opposing AI to carve out spaces for freedom, Lange's socialist teleology reaffirms the humanist principle that economic development must be centered on humanity. This counters the dehumanizing tendencies of AI development and presents a relatively optimistic future: one where economic control technologies remain under human rational control and are used to reduce class inequalities, ultimately achieving the liberation of labor.

6. Conclusion

In conclusion, the exploration of Oscar Lange's economic theories reveals both the potential and limitations of integrating computer technology within socialist frameworks. While Lange's vision of a cybernetic economy aimed to enhance efficiency and democratize resource allocation, the practical challenges he faced during the Cold War hindered the realization of his ideas. Today, as artificial intelligence transforms production and labor dynamics, Lange's theories appear increasingly relevant. The rise of AI offers a unique opportunity to revisit his insights, especially regarding the role of technology in managing economic relations and the necessity for grassroots democratic involvement.

The current trajectory of AI development raises significant concerns about deepening class divisions and the dehumanization of labor under capitalism. While Lange's proposals for a blended approach of central planning and decentralized management remain valuable, the realities of AI within a capitalist framework diverge sharply from his original socialist vision. The growing integration of AI in the workforce often exacerbates social inequalities and leads to new forms of exploitation, as seen in the digital economy's monopolistic tendencies. Despite these challenges, Lange's emphasis on the importance of human-centered economic development offers a hopeful perspective for the future. His ideas encourage a reevaluation of how technology can be utilized not merely as a tool for profit maximization but as a means to empower workers and reduce inequality.

However, this study is not without limitations. It primarily focuses on Lange's theoretical frameworks and their historical context, potentially overlooking contemporary empirical data on the impacts of AI in various industries. Future research should seek to incorporate quantitative analyses of AI's effects on labor markets and economic inequalities, as well as qualitative studies that capture the experiences of workers within these evolving systems

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