

A. A. BOGDANOV'S THEORY OF EQUILIBRIUM AND THE ECONOMIC
DISCUSSIONS OF THE 1920s

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I

A. A. BOGDANOV WAS ONE OF the most interesting scholars of the 20th century. His works exerted a great influence on the development of many disciplines. Tektology—the universal science of organisation, created by Bogdanov is rightly considered to be the forerunner of cybernetics and general systems theory. His economic works, however, have not been subjected to full objective evaluation. To do this is a complex undertaking. Here we intend to consider what influence Bogdanov's conception of equilibrium and the law of labour expenses which he formulated had on Soviet economics of the 1920s. It is commonly supposed that Marxist economics is incompatible with the theory of equilibrium. The main argument used to support this contention is the fact that the process of development is described by them differently. According to Marxist conceptions development is envisaged as the result of a struggle of opposites. Thus the concept of equilibrium, it is asserted, contradicts Marxist dialectics. This point of view is subscribed to by many Soviet and non-Soviet scholars. In the Soviet economic encyclopedia the theory of equilibrium is condemned, as one might expect, as bourgeois.¹ In his turn I. Susiluoto, a student of Bogdanov's and N. I. Bukharin's ideas, headed one of the paragraphs of his book on the history of systems analysis in the USSR, 'From Dialectics to the Theory of Equilibrium'.²

The problem of the relationship between Marxism and the theory of equilibrium is interesting in itself and has a great significance for Soviet economics. Thus, the equilibrium model plays an important part in mathematical economics. Consequently the relationship between the theory of equilibrium and Marxism is crucial for the question of the compatibility of Marxism both with mathematical economics and with the whole of Western economics. The objective study of the theory of equilibrium also enables one to give a more substantial evaluation of Bogdanov's system of ideas and of the whole of Soviet economics of the 1920s.

II

Marx repeatedly stressed that anarchy of production is characteristic of the capitalist economic system. In expounding the theory of reproduction he used the term 'equilibrium', but in doing so he pointed out that although commodity production created the possibility for the normal course of reproduction on both a simple and an expanded scale, 'these conditions', however, 'turned into an equal

number of possibilities for crisis, since on the basis of the spontaneous pattern of this production, this equilibrium is itself an accident'.³ This statement by Marx has been much quoted by critics of the theory of equilibrium. However, this and similar utterances by Marx have to be correctly interpreted.

One of the basic ideas of Marxism is the existence of objective economic laws. The main law of commodity production is the law of value. The market price of a commodity in the course of its fluctuations only accidentally coincides exactly with its value, but it is value which is the law of prices. Therefore Bukharin was right to say that 'the law of value is the law of equilibrium of the simple commodity system of production'.⁴ Seen in this light the problem of the concept of equilibrium is treated as a lasting tendency. Bogdanov addressed the problem of equilibrium in the book *Filosofiya zhivogo opyta* published in 1913. In the second part of *The Universal Science of Organisation* he discusses Le Châtelier's principle that: 'if any change of conditions is imposed on a system in equilibrium, then the system will alter in such a way as to counteract the imposed change'; he argues that this principle has a universal, tektological character.⁵ Bogdanov examined the concept of equilibrium in some detail. In his opinion: 'a system of equilibrium is one which maintains its structure in a given environment'.⁶ The idea of the struggle of opposites is not at all denied, in so far as it is stated that 'the structure of systems of equilibrium is characterised by the fact that they contain within themselves diametrically opposed processes, mutually neutralising one another at a certain level'.⁷ Bogdanov also emphasised that the use of the concept of equilibrium did not signify an 'exact, complete equilibrium', but only 'a tendency towards it with fluctuations in two directions', and that systems of equilibrium could consist of imbalanced complexes (systems) and *vice versa*.⁸ One may take it that the passages cited above are sufficient to show that the traditional conception of Bogdanov's theory of equilibrium as denying dialectics does not hold water.

Bogdanov began his elaboration of the theory of equilibrium within the framework of his general theory of organisation. After the revolution, when the task of constructing the new society began to be put into practice, he turned his attention to economic problems. His lecture at the First All-Russian Initiative Conference on the Scientific Organisation of Labour and Production in January 1921 had great significance. In that lecture Bogdanov formulated the principle that: 'the equilibrium of social economy is possible when through distribution each of its elements receives all the necessary means for carrying out its social-productive function'.⁹ From this law of distribution and from the existence of a chain link between the branches of the economy he derived the necessity of a certain proportionality in the economy as a condition for equilibrium of the economic system. In his opinion, to draw up a single economic plan it was first of all necessary to take account of how the various branches of the economy related to one another. The means of doing this proposed by Bogdanov anticipated several ideas of an inter-branch balance. The calculation of the proportion would determine the 'norm of equilibrium', the point of departure for further construction. This norm served as a point of comparison for the given conditions of the economy. This would determine the priorities for projects to reconstruct the

economy's various sectors. Bogdanov's ideas on organised planning exerted a great influence on many Soviet economists.

The conception of economic equilibrium is important for the whole system of Bogdanov's ideas. In the first place equilibrium is treated as a condition for the normal organisation of distribution and exchange for different social formations. 'Exchange by the value of labour is the norm of living equilibrium'.¹⁰ This norm in commodity production acts 'only as a spontaneous tendency', brought about with constant infractions, and only in 'the epoch of collectivism becomes the principle of the scientific and conscious organisation of society'.¹¹ Bogdanov investigated in detail those conditions in connection with which equilibrium in a capitalist economy is constantly disturbed. It is worth noting that in studying the influence which the market in consumer goods has on the output of means of production he in fact makes use of the idea of the multiplier.¹² The necessity of an equilibrium is regarded as the necessity for a definitive proportionality in the economy, and in this regard the basic difference in the mechanism for achieving this equilibrium is emphasised — whereas under capitalism it is attained through spontaneous fluctuations, in the conditions of the collectivist regime it comes as a result of the scientific planned organisation of the economy.

The idea of equilibrium was closely connected with the law of labour expenses, a conception which was elaborated by Bogdanov and after him by Bukharin. In this they relied on Marx's postulate put forward in the well-known letter to Kugelmann. In this letter Marx wrote:

the volume of products corresponding to the various needs calls for various and quantitatively determined amounts of total social labour . . . This necessity for the division of social labour in definite proportions cannot be eliminated by the specific form of social production; it can only alter its form of appearance . . . And the form in which this proportional division of labour manifests itself in a condition of society in which the interconnection of social labour exists in the form of the private exchange of the individual products of labour, is precisely the exchange value of these products.¹³

In fact this letter speaks of the existence of an economic law, valid for all economic formations, which regulates the proportions of the economy and in the conditions of commodity production manifested itself in the form of the law of value. Marx attributed great importance to this law; he compared it with the laws of nature, which, like this law, it was impossible to eliminate.

Bogdanov called this law the law of labour expenses. Speaking in the discussions which took place in the Communist Academy on E. A. Preobrazhensky's paper 'The Law of Value in the Soviet Economy', he said that under capitalism the spontaneous regulator was labour expenses. In the transitional formations labour expenses also served as a regulator, but 'in a somewhat more systematic form'. In so far as even under socialism labour expenses would serve as a regulator, this was proof of the existence of an underlying regularity which 'under capitalism takes the form of the law of value'.¹⁴ This treatment of the law of labour expenses was used by Bogdanov to argue that political economy had a historical character. It is symptomatic that in the discussions in the Communist Academy on I. I. Skvortsov-Stepanov's lecture on the subject of political economy Bogdanov spoke

against Bukharin, who contended that the subject of political economy was commodity production.¹⁵ At that time the correct views of Stepanov and Bogdanov were rejected by the vast majority of Soviet scholars.

Thus, the concept of equilibrium, in the opinion of Bogdanov, is a fundamental one of political economy, being closely connected with such categories as proportionality and planning.

III

In the 1920s, although Bogdanov studied economic theory, he did not take part in the discussions on Soviet economic policy. Nevertheless, in many respects his ideas influenced these discussions. This was due to the fact that the textbooks on economics he had written (including those written in conjunction with Skvortsov-Stepanov) were widely popular, and also because his ideas on equilibrium were developed further in the works of Bukharin, V. A. Bazarov and other scholars. It may be remarked that to provide a complete analysis of the influence of Bogdanov's conception of equilibrium on Soviet scholars of the 1920s is no easy matter, if for no other reason than that the term 'equilibrium' was in general use and in fact was considered to be a synonym for the concept of proportionality.¹⁶ However, considering that the works of Bukharin had a very great influence in the 1920s, one may conclude that through these works Bogdanov's ideas exerted a much greater influence on economists than they might have done directly.

Bukharin accorded a cardinal importance to the concept of equilibrium. In this respect his book *Economics of the Transition Period* is extremely interesting. There it is stated that finding the law of equilibrium is the basic task of theoretical economics.¹⁷ Of the capitalist economy Bukharin wrote that it was in 'constant movement and fluctuation, but that in general it was in a state of equilibrium'.¹⁸

An analysis of Lenin's remarks on what Bukharin said about equilibrium shows that they are not as unambiguous as was previously believed. Against the words of Bukharin quoted above, Lenin wrote: 'approximately, roughly, in rounded up figures, *à la longue*'.¹⁹ However, Bukharin himself stressed that his analysis of the capitalist economy

from the point of view of equilibrium had nothing in common with a *harmonia praestabilitata*, because it arises from the fact that this system exists and from the fact that the same system develops. Development of this kind presupposes a type of this equilibrium which is of a moving and not a static kind.²⁰

On this statement Lenin observed:

This is very good. But would it not be more exact to speak of 'the necessity of a certain proportionality' than of 'the point of view of equilibrium'? It would be more exact, more correct, because the former is objective, while the latter opens the door to philosophical meanderings from materialism to idealism.²¹

Although the reproach about idealism might seem unexpected, it is in fact easily explained.

In the preface to his book Bukharin had noted that many terms were used by

him in the sense in which Bogdanov had employed them. As is generally known, in his book *Materialism and Empiriocriticism* Lenin had subjected the philosophical errors of Bogdanov to severe criticism. Bogdanov had not agreed with these strictures and replied to Lenin in the book *Vera i nauka* (1910). Lenin's attitude to Bogdanov coloured his evaluation of Tektology. Although Bukharin tried to explain to Lenin that the universal science of organisation was something different from Empiriomonism, Lenin was not convinced.²²

In his remarks on Bukharin's book Lenin repeatedly reacted critically to borrowings from the vocabulary of Tektology, calling it 'organisational gibberish'.²³ This terminological borrowing Lenin considered to be the reason for the idealistic mistakes Bukharin had made in his book.²⁴ The term 'equilibrium' was one used by Bogdanov. Moreover, Lenin's general impression of Bukharin's book was positive. He called it 'an excellent work' and favoured future editions of the book.

Bukharin was familiar with the remarks Lenin had made on his book in May 1920. Considering the amicable relations between the two men, one can be sure that Bukharin knew of the remarks immediately after they were made. This supposition is supported by the contents of Bukharin's book *Teoriya istoricheskogo materializma*, which appeared in 1921, in which the problem of equilibrium was treated in a dialectical way. In particular, the process of development is described in it as follows:

... first, the state of equilibrium, second, the disruption of this equilibrium, third, the restoration of the equilibrium on a new basis. Then the story is repeated from the beginning. As a whole what we have here is the process of movement, the basis of which is the development of internal contradictions.²⁵

That in his writings, and in particular in his conception of equilibrium, Bukharin followed Bogdanov, was noticed not only by Lenin, but by other scholars as well, and at the beginning of the 1920s Bukharin was repeatedly criticised for doing this.

The stepping up of criticism of Bogdanov's views which developed during the 1920s has already been written about elsewhere.²⁶ It must be remarked, however, that whereas his philosophical ideas were subjected to constant criticism, in economics the theory of equilibrium held sway for quite some time.

IV

The formation in the USSR of a planned system made the problem of balancing the economy a pressing one. A great achievement in this area was the balance sheet of the Soviet economy for 1923/24 published by the TsSU SSSR.²⁷ The man in charge of the work, P. I. Popov, wrote in the introduction that the term 'balance' meant equilibrium and that the methodological basis for constructing the balance was Marx's schemes of reproduction. In expounding the questions connected with the reproduction schemes Popov made extensive use of the designations and terminology introduced by Bukharin. The authors of the balance subscribed completely to the theory of equilibrium.

The recognition of the necessity for economic equilibrium was typical of the majority of Soviet economists of the 1920s. In 1928 Bukharin wrote that for the economics of the transition period

one could construct, by analogy with the second volume of *Capital*, 'reproduction schemes', i.e. set out the conditions for the sound combination of different spheres of production and consumption and different spheres of production among themselves, or, in other words, conditions for the moving economic equilibrium . . . Herein consists the task of elaborating a national economic plan, which more and more approximates to the balance of the whole economy.²⁸

Such an approach to the construction of a balance and planning led to a definite economic policy—the policy of balanced growth of the economy.

In so far as the conception of equilibrium was shared by the majority of economists in the period under discussion, the idea of balanced growth was also generally accepted. In the economic discussions on economic policy one of Bukharin's main opponents was Preobrazhensky, author of the law of primitive socialist accumulation. According to this law the development of the socialist sector in the Soviet economy should be accomplished by alienating the part of the product created by the peasantry. This policy could have jeopardised the alliance of the workers and the peasantry. For our purposes, however, it is important to note that even Preobrazhensky believed it necessary to maintain equilibrium in the economy and to overcome disproportions. It was he who formulated seven conditions for equilibrium in the Soviet economy.²⁹

In this respect the traditional view of Preobrazhensky as the scholar who provided the theoretical basis for the Stalinist policy of forced collectivisation, directed towards acquiring the sources of accumulation for industrialisation, needs a radical reassessment. His proposals concerning economic policy envisaged the maintenance of NEP, and the pumping over of the surplus product from agriculture into industry had to be brought about by economic means.

It must be stressed that Bukharin's understanding of the conception of equilibrium was much more profound than that of Preobrazhensky. For Bukharin equilibrium was connected with the law of labour expenses, which regulated the proportions of the economy. From the necessity of maintaining definite proportions in the economy Bukharin came to the following conclusion: 'if any branch of industry does not systematically receive back the costs of production plus a certain additional sum, . . . which is able to serve as a source of expanded reproduction, then it will either remain at the same level, or it will regress'.³⁰ From this sound view is derived the necessity for a balanced development of all sectors of the economy. The mutual connection of the sectors determined the regularities governing the tempos at which growth took place in the economy. Bukharin emphasised that: 'the highest tempo is obtained with the combination in which industry rises on a quickly growing agriculture'.³¹ These correct ideas of Bukharin's were for some time incorporated in economic policy. The conception of a balanced development of the economy was reflected in the directives of the XV congress in 1927.

V

The problem of the balanced nature of economic growth was closely connected with the discussions on genetic and teleological approaches to planning. According to the genetic approach an appraisal of the emerging tendencies in the economy ought to serve as the basis of forward planning. With the teleological approach the accent was placed on directive planning, associated with the establishment and accomplishment of set objectives. In Soviet historiography the adherents of the genetic approach are customarily presented as opponents of structural transformations in the economy, and consequently as opponents of industrialisation.

In fact a number of pronouncements by such major economists as V. G. Groman or Bazarov, apparently, gave grounds for such conclusions. Thus, Groman wrote that 'equilibrium, although a moving equilibrium, of the economic organism of the country is the highest postulate, every infringement of which immediately leads to a crisis and compels one to correct the deviation from its demands'.³² Groman considered the aim of the reconstruction process taking place in the Soviet economy to be the attainment of a number of proportions characteristic of the economy in the pre-war period. Of course, those concrete proportions, or 'static coefficients', which Groman proposed as 'regulative norms' were open to criticism, which initially had an academic character. Moreover, in the works of adherents of the genetic approach an attempt was made to perceive and reckon with objective economic regularities in planning, something which was at times lacking in representatives of the teleological current.

The terms themselves—the genetic and teleological approaches—were introduced by Bazarov, in works which achieved a synthesis of these two currents. Bogdanov's ideas were a major influence upon him. Bazarov made a major contribution to the elaboration of the methodological problems of using the mathematical method for studying the economy. In the introduction to his book *Kapitalisticheskie tsikly i vosstanovitel'nyi protsess khozyaistva SSSR* he wrote that what was new in his work was the attempt to apply 'constructive models on the pattern of exact natural science' for investigating economic laws, which assumed 'the existence of structural forms or organisational connections of universal validity'.³³ In this connection Bazarov stressed that 'finding formally identical quantitative correlations within the most profound qualitative differences and the construction on this basis of simple schematic "models" is a method constantly applied in exact science and has vindicated itself fully'.³⁴ Thus, the ideas of Bogdanov on the universality of organisational structures allowed the possibility of applying the methods of modelling to economics.

VI

In building a model of the Soviet economy Bazarov took the conception of equilibrium as his point of departure. Here he distinguished different types of equilibrium. Thus, mechanical equilibrium was characterised by the immutability of all the component parts and connections of the system. Dynamic equilibrium

maintained the correspondence between the components of the system, all the dimensions of which changed simultaneously. Moving, or statistical equilibrium supposed a constant metabolism and energy between the given system and the environment.³⁵ In Bazarov's opinion it was only possible to speak of social phenomena in terms of moving or statistical equilibrium. The special feature of the reconstruction process in the USSR he considered to be that the mechanism by which the state of pre-war equilibrium had been departed from had itself created new conditions of equilibrium.

The attainment of the pre-war correlations, Bazarov considered, was hindered by the constant raising of social demand over the output of production. To achieve equilibrium it was necessary to limit demand by capitalist methods—something which did not correspond to the political and economic regime of the USSR. Therefore, 'the tendency towards relative underproduction must be recognised to be just as characteristic for our social system as the tendency to overproduction is for capitalism'.³⁶ Starting out from the conception of equilibrium Bazarov in fact came to the conclusion that a characteristic feature of the Soviet economy is the tendency towards imbalanced development.

Although the first five-year plan itself was directed towards a balanced growth of the economy, during the course of its fulfilment a number of difficulties arose. The shortage of consumer goods and the fact that the purchase price for grain did not cover the expenses of its production led in 1928 to a reduction in grain sales by the peasants. To ensure grain procurements the methods of the War Communism period were employed. A leading group in the party and government, led by Bukharin, opposed this turn of events, but were labelled 'right-wing deviationists' and after a bitter struggle were defeated. As a result of the curtailment of the New Economic Policy the command-administrative system of managing the economy arose.

Command methods in management corresponded to the subjectivist, voluntaristic approach to economic theory. The conception of unbalanced growth came to dominate. Speaking at the conference of agrarian Marxists on 27 December 1929, Stalin subjected the theory of equilibrium to severe criticism. In his speech he tried to present matters as if the theory of equilibrium of sectors stated that the socialist sector and the 'non-socialist sector, or if you like—the capitalist sector' would at some future time coalesce and the result would be socialism.³⁷ Here Stalin understood by the socialist sector state industry, and by the non-socialist sector, the small peasant farms. Of course this was a crude distortion of the ideas behind the conception of equilibrium. The necessity of 'spreading collective and state farms' was motivated by the alleged fact that small peasant farms not only did not carry out expanded reproduction, but even 'very rarely had the possibility of implementing even simple reproduction'.³⁸ At that very time Stalin was urging that the peasantry ought to pay a 'supertax' to provide resources for industrialisation, which would be obtained as a result of the increasing differential between industrial and agricultural production.³⁹

In his speech at the conference of agrarian Marxists, Stalin tried to justify his criticism of the theory of equilibrium with references to the theory of reproduction, and called the theory of equilibrium 'utopian', 'anti-Marxist' and 'laughable'.

He thought it urgent for a scheme of the balance of the economy to be elaborated, since ‘the one that had been published by TsSU in 1926 in the form of a balance sheet of the economy is not a balance, but a juggling with figures. Nor is the manner in which Bazarov and Groman treat the problem of balance in the economy suitable’.⁴⁰ Obviously one of the reasons why Stalin criticised the balance sheet of the TsSU was that its authors subscribed to the conception of equilibrium. Soon after this speech Groman and Bazarov were arrested on the charge of belonging to the so-called counter-revolutionary organisation of the Mensheviks and of wrecking activities.

Their sabotage in Gosplan, according to the obviously forced confession of Groman at his trial in 1931, consisted in exaggerating the existing difficulties, of alarmist reports about a possible economic catastrophe and ‘during the drawing up of the forward plans, emphasising the primacy of the genetic viewpoint over the teleological one (Groman) or of the equal validity of the two approaches (Bazarov)’.⁴¹ The press conducted a vociferous campaign against the wreckers and ‘rightists’. Their allegedly bourgeois theories, including the theory of equilibrium, were criticised. Thus, R. E. Vaisberg wrote of Groman that ‘instead of a plan and objectives, for which one had to strive, he wanted to balance all problems on the principle of a mechanical equilibrium’, and he called Bazarov’s methodology ‘rotten’ and ‘extremely hostile to socialist construction’.⁴² The critics took care to note that the views of Bukharin and Bazarov were formed under the influence of Bogdanov’s ideas. Thus, P. Vyshinsky wrote: ‘With Bazarov we have the full set of tektological gibberish — “organisational links”, “structural forms”, “universal applicability” . . . “quantitative analysis” (instead of qualitative), etc., “models”’.⁴³ By this time the identification of a viewpoint with the ideas of Bogdanov was sufficient to demonstrate the falsity of that viewpoint.

VII

The abandonment by Soviet economists of the concept of equilibrium and of the law of labour expenses led to the denial that laws common to different formations existed. This resulted even in the denial that Marx’s reproduction schemes were applicable to the analysis of the Soviet economy. Thus, in 1932 T. Spivak published an article in which he analysed the reproduction processes in the Soviet economy. He stated that it was necessary to maintain a certain proportion between the departments of the economy and that $I(v+s)$ must be equal to $II(c)$.⁴⁴ Here he referred to Lenin’s idea that even under pure communism the relationship of $I(v+s)$ to $II(c)$ would still exist.⁴⁵ This article was severely criticised by S. Partigul, who described Spivak’s approach as ‘a variant of the theory of equilibrium’ and the thesis that it was possible to use Marx’s reproduction schemes to analyse the Soviet economy as Bukharinist.⁴⁶ Both statements were true of course, but it by no means followed that Spivak should have been accused of ‘anti-Marxist methodology’. The abandonment of the use of reproduction schemes led to the denial in general that quantitative regularities of proportion existed in the Soviet economy.

All this had its inevitable effect on working out the balance sheet of the

economy. In 1932, in the article '*K voprosu ob ekonomike sotsializma*', N. A. Voznesensky asserted that the theory of equilibrium was one subscribed to by 'wreckers', 'right-wing opportunists', and 'counter-revolutionary Trotskyists'. Consequently, none of them understood the problems of balance. 'Reproduction is not equilibrium . . . Balance, as an integral component of the socialist plan ought to show up "bottlenecks", not in order that adjustments can be made for them, but in order that these bottlenecks should be eliminated'.⁴⁷ Here, however, it was overlooked that eliminating bottlenecks took resources and time. The subjective treatment of economic laws which came about led to the fact that despite the direct instructions of Stalin that it was necessary to work out a balance sheet of the economy, the compilation of tables showing the balance of costs gradually ceased and was renewed only at the end of the 1950s.

In fact, it is impossible to compile a balance sheet if one denies the necessity for equilibrium and definite proportions in the economy. When in 1936 S. G. Strumilin attempted, with references to Lenin, to prove the necessity of maintaining in the balance sheet the proportions $I(v+s)=II(c)$,⁴⁸ he was accused of 'a complete distortion of Lenin' since 'the relationship of c , v , s , and other elements in socialist reproduction is determined at each juncture by the dictatorship of the working class relative to the tasks of socialist construction, and not on the basis of the law of value'.⁴⁹ The editorial board of *Planovoe khozyaistvo* declared Strumilin's article 'counter-revolutionary' and its publication a 'political error'.⁵⁰

VIII

The criticism to which Bogdanov's ideas were subjected (including the idea of equilibrium) had dire consequences not only for economic theory. The adoption in practice of the conception of unbalanced growth led to the irrational use of economic resources. The results of that have still to be assessed by historians. One must agree with R. W. Campbell's opinion that: 'the purging of the equilibrium concept from the economists' working ideas should be put down on the list of Stalin's crimes not only as a crime against economics but against Marxism as well'.⁵¹

For some considerable time Bogdanov's views have been given an exclusively negative assessment. The proximity of tektology to cybernetics was one of the reasons why cybernetics was persecuted at the end of the 1940s and beginning of the 1950s. It was only at the end of the 1950s that Bogdanov's ideas began to be studied systematically. But it is only now that a sufficiently full and objective perception of Bogdanov's significance as a scholar is starting to emerge in the Soviet Union. As a result of this process the theory of equilibrium and the law of labour expenses should be 'rehabilitated' and recognised as an integral element of Marxist economics. This in its turn will lead to a re-evaluation of several economic discussions of the 1920s and changes in modern economic theory.

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- ² I. Susiluoto, *The Origins and Development of Systems Thinking in the Soviet Union*, (Helsinki, 1982), p. 79.
- ³ K. Marx, *Capital*, Vol. II; K. Marx, F. Engels, *Sochineniya*, 2nd edition, Vol. XXIV, p. 563.
- ⁴ N. I. Bukharin, *Ekonomika perekhodnogo perioda*, Part 1, (Moscow, 1920), p. 129.
- ⁵ A. A. Bogdanov, *Vseobshchaya organizatsionnaya nauka. (Tektologiya)*, Vol. 2, (Moscow, 1917), p. 100.
- ⁶ A. A. Bogdanov, *Vseobshchaya organizatsionnaya nauka. (Tektologiya)*, 3rd edition, Vol. 1, (Moscow-Leningrad, 1925), p. 253.
- ⁷ *Ibid.* p. 258.
- ⁸ *Ibid.* pp. 260, 262.
- ⁹ A. A. Bogdanov, 'Organizatsionnye printsipy edinogo khozyaistvennogo plana', *Ekonomika i matematicheskie metody*, 1988, Vol. XXIV, No. 5, p. 798.
- ¹⁰ A. A. Bogdanov & I. I. Stepanov, *Kurs politicheskoi ekonomii*, Vol. II, Part 4, (Moscow, 1923), p. 40.
- ¹¹ *Ibid.* p. 293.
- ¹² A. A. Bogdanov, *Kratkii kurs ekonomicheskoi nauki*, (Moscow, 1922), pp. 223–24.
- ¹³ Marx to Kugelmann, 11 July 1868, K. Marx, F. Engels, *Sochineniya*, 2nd edition, Vol. XXXII, pp. 460–61.
- ¹⁴ *Vestnik Kommunisticheskoi akademii*, 1926, kn. 15, p. 214.
- ¹⁵ *Vestnik Kommunisticheskoi akademii*, 1925, kn. 11, pp. 292–9, 301–07.
- ¹⁶ See for example L. D. Trotsky, *K VIII s'ezdu Sovetov. Put' k edinomu khozyaistvennomu planu.* (Pokhodnaya tipografiya poezda Predrevvoensoveta Trotskogo, 1920), p. 4.
- ¹⁷ Bukharin, p. 128.
- ¹⁸ *Ibid.*
- ¹⁹ V. I. Lenin, 'Zamechaniya na knigu N.I. Bukharina *Ekonomiya perekhodnogo perioda*', *Leninskii sbornik*, Vol. 40, 1985, p. 13.
- ²⁰ Bukharin, p. 130.
- ²¹ *Leninskii sbornik*, Vol. 40, p. 414.
- ²² *Leninskii sbornik*, Vol. 12, pp. 384–85.
- ²³ *Leninskii sbornik*, Vol. 40, p. 428.
- ²⁴ *Ibid.*, pp. 428–29.
- ²⁵ N. I. Bukharin, *Teoriya istoricheskogo materializma*, (Moscow, 1921), p. 77.
- ²⁶ I. Yakhot, 'Gibel' tektologii Bogdanova — pedshestvennitsy kibernetiki i sistemnoi teorii', *SSSR. Vnutrennie protivorechiya*, Vyp. 3, 1982, pp. 227–73.
- ²⁷ *Balans narodnogo khozyaistva SSSR za 1923-24g. Trudy TsSU*, Vol. XXIX, (Moscow, 1926).
- ²⁸ N. I. Bukharin, *Izbrannye proizvedeniya*, (Moscow, 1988), pp. 395–96.
- ²⁹ E. A. Preobrazhensky, 'Khozyaistvennoe ravnovesie v sisteme SSSR', *Vestnik Kommunisticheskoi akademii*, 1927, kn. XXII, pp. 19–71.
- ³⁰ Bukharin, *Izbrannye proizvedeniya*, p. 405.
- ³¹ *Ibid.* p. 399.
- ³² V. G. Groman, 'O nekotorykh zakonomernostyakh, empiricheski obnaruzhivaemykh v nashem narodnom khozyaistve', *Planovoe khozyaistvo*, 1925, No. 1, p. 91.
- ³³ V. A. Bazarov, *Kapitalisticheskie tsikly i vosstanovitel'nyi protsess khozyaistva SSSR*, (Moscow-Leningrad, 1927), p. 3.
- ³⁴ *Ibid.* p. 66.
- ³⁵ *Ibid.* pp. 61–5.
- ³⁶ *Ibid.* p. 99.
- ³⁷ I. V. Stalin, 'K voprosam agrarnoi politiki v SSSR', *Sochineniya*, Vol. XII, pp. 143–44.
- ³⁸ *Ibid.* pp. 145–46.
- ³⁹ I. V. Stalin, 'O pravom uklone v VKP(b)', *Sochineniya*, Vol. XII, p. 50.
- ⁴⁰ Stalin, 'K voprosam agrarnoi politiki . . .', p. 171.
- ⁴¹ *Protsess kontrevolyutsionnoi organizatsii men'shevikov*, (Moscow, 1931), p. 37.
- ⁴² R. E. Vaisberg, 'Burzhuaznye izvrashcheniya v oblasti planirovaniya', *Planovoe khozyaistvo*, 1930, No. 1, pp. 21–38.
- ⁴³ P. Vyshinsky, 'Obrazchik vreditel'skoi filosofii (bazarovshchina)', *Pod znamenem marksizma*, 1931, No. 1–2, p. 135.

⁴⁴ T. Spivak, 'O balanse proizvodstva i potrebleniya v SSSR za 1928–1930gg.', *Problemy ekonomiki*, 1932, No. 7, p. 45.

⁴⁵ *Leninskii sbornik*, Vol. 40, p. 384.

⁴⁶ S. Partigul, 'Ob izvrashcheniyakh v teorii vosproizvodstva v SSSR', *Problemy ekonomiki*, 1932, No. 8, p. 206.

⁴⁷ N. A. Voznesensky, *Izbrannye proizvedeniya*, (Moscow, 1979), p. 119.

⁴⁸ S. G. Strumilin, 'K teorii balansa narodnogo khozyaistva', *Planovoe khozyaistvo*, 1936, No. 9–10, p. 87.

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⁵⁰ *Ibid.*, p. 111.

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