

Chapter 2

Marxism and Ecology: Marx's Theory of Labour Process Revisited

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Abstract This chapter will reflect on the relations between Marxism and ecology by probing into two kinds of comments which are derived from the dual logic of labour process theory in *Capital*: some scholars claim that Karl Marx is an anthropocentrist advocating 'domination of nature', while others argue that Marx is a nature-centrist emphasising 'the root source of nature'. In the author's point of view, it is the seemingly featureless introduction of the concept of material metabolism that has endowed Marx's concept of labour with modern ecological implication. On the surface, the twofold logic and evaluations of Marx's labour concept seem contradictory. If seen from the perspective of materialist dialectics, however, it is a kind of unity at a higher level rather than a contradiction any longer, namely, a dialectical unity of 'realisation of purpose' and 'material metabolism' based on 'nature as the root-source'. Therefore, the author argues that Marxist methodology on environmental issues can neither be 'natural-centrism' or 'life-centrism' nor 'technology optimism' or extreme 'anthropocentrism'; instead, it should be a materialist dialectic theory which has abandoned the inherent confrontation between and achieved the dialectical unity of them.

Keywords Environmental thoughts • Labour process theory • Marx's ecology • Mastery over nature • Material metabolism

When we discuss the relations between Marx and ecology, we are sometimes apt to pay attention to Marx's concept of labour first of all. The reason why we have such a reflection is due to the nature of environmental problem itself, which is determined by the relations between human beings and the surrounding natural world. The concept of labour has precisely embodied mankind's attitudes towards

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nature as well as the relations between humanity and nature. As a result, in the research of eco-Marxism, no matter the critiques or defenses towards Marx, his Labour concept is always a matter of paramount importance to be addressed. In a sense, Marx's theory of labour process has been becoming a touchstone to check whether there is ecological thinking in Marx's thoughts as well as whether Marxism has the potential to offer effective thought resources for solving the contemporary environmental crisis or not.

Eight years ago, in my book *Ecology and Marx* (2001), I discussed the environmental thoughts in Marx's theory of labor process in detail. At that time, the emphasis of my analysis was to respond to the critiques raised by the scholars such as Ted Benton and Yoshirou Tamanoi on Marx's labor process theory. Accordingly, I did not expound the essence of Marx's theory of labour process hiding behind the critiques, especially the dual logic ('realisation of purpose' and 'material metabolism') which is embodied in the labour process. Whereas, I believe that further work in this regard can better respond to the critiques towards Marx from the green theorists, and constitutes the appropriate starting point to probe into Marx's environmental thoughts. Nowadays, research on eco-Marxism has achieved considerable progress. For example, in Japan, Takashi Shimazaki published *Eco-Marxism* (2007) and Jyun Takada published *Exploration of Environmental Issues* (2003), and so on. Moreover, some representative works of eco-Marxism in the West such as John B. Foster's *Marx's Ecology* have been translated into Chinese and Japanese. On the whole, eco-Marxism study is entering into a new stage by turning from speaking of superficial and radical critiques to internal analysis of Marxism. In this chapter I will concentrate my analysis on the core issue in the discussion of eco-Marxism, namely, to analyse the relations between Marxism and ecology by probing into two kinds of comments on Marx, which are derived from the dual logic of labour process theory in *Capital*: on one hand, some scholars claim that Marx is an anthropocentrist advocating 'domination of nature', while on the other hand, others argue that Marx is a nature-centrist emphasising 'the root source of nature'.

The Definition of 'Labour Process'

As we all know, the most classic definition of labour comes from the Chapter five – 'The Labour Process' – in *Capital*, Vol. I. In this chapter, Marx defined labour process clearly as follows:

Labour is a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material re-actions [Stoffwechsel] between himself and Nature. He opposes himself to Nature as one of his own forces, setting in motion arms and legs, head and hands, the natural forces of his body, in order to appropriate Nature's productions in a form adapted to his own wants. (Marx 1969: 192)

Thus, the elementary factors of labour process include: the personal purposeful activity of man (i.e., work itself), the subject of that work and its instruments (Marx 1969: 193).

From this definition, labour process can be classified into two aspects: 'man of his own accord starts, regulates, and controls' and 'the material re-actions [Stoffwechsel] between man and Nature'. The former aspect puts emphasis on that labour is a purposeful activity of human beings to reconstruct nature, while the latter focuses on that labour is a metabolist process of natural substance. Takashi Shimazaki has once described these two aspects as 'on one hand, the objectification activity of purpose realisation; on the other hand, the natural process of material metabolism' (Shimazaki 1997: 209). Throughout this chapter, I will comply with the description of Takashi Shimazaki to the two aspects of labour as 'purpose realisation' and 'material metabolism', and go further to call them as the dual logic of labour process.

According to Aristotle's differentiation of 'form' and 'matter', the form is active and the matter is passive. Anything in the world is a combination of form causes and matter causes. If we apply this differentiation to the interpretation of labour process, human beings are form causes while natural objects are matter causes. Labour is a combination process of humanistic form and natural substance. Correspondingly, 'realisation of purpose' refers to a formalisation process in which natural objects are endowed with humanistic forms by human beings. During this process, humans are the subject of labour with special purposes such as wills and plans; by contrast, natural substances are only labour objects and instruments without special motive, as well as are the means to realise human purposes and to prove their inbeing power. The differentiation of ends and means has inevitably led to the position-imbalance between humanity and nature, which gives rise to the following result: human beings impose their intentions on nature from outside, so as to cause nature to succumb to the human wills. By contrast, 'material metabolism' refers to that natural substances still maintain their identity during the process of formalisation. Although having been vested with humanistic forms, natural substances themselves have not been changed at all and still carry on 'self-implementation' with obstinacy. As a result, in the definition of 'material metabolism', natural substances are the eternal master of their own destiny while the vested humanistic forms are temporary and accidental.

Obviously, the two defining aspects of labour process are heterogeneous and antagonistic, and people can make two completely opposite observations from the ecological perspective. In the first place, some scholars may emphasise the meaning embodied in 'realisation of purpose', making an interpretation that Marx is an anthropocentrist advocating 'domination of nature'. For instance, in the paper of 'Marxism and natural limits' which provoked a hot debate in the following years, Benton criticised that 'Marx under-represents the significance of non-manipulable natural conditions of labour process and over-represents the role of human intentional transformation process vis-à-vis nature' (Benton 1989: 64). As a result, Marx was described as an extreme advocate of 'domination of nature'. Secondly, the others may focus on the defining meaning of 'material metabolism' and argue that Marx is a nature-centrist emphasising 'the root source of nature'. For example, John B. Foster, starting from Marx's materialism, has drawn a bold conclusion that Marx's theory itself is one kind of ecology. In the next sections, we will take a close look at the two dimensions of labour process and the two derived oppositional evaluations.

‘Realisation of Purpose’ and ‘Domination of Nature’

What is ‘Domination of Nature’

What is ‘domination of nature’? Why most of the environmentalists abhor the concept of ‘domination of nature’? In this context, eco-socialist Reiner Grundmann has once made a wonderful summary:

Among the many ideas which have shaped the debate about ecological problem in recent years, the issues connected to the notion of ‘mastery over nature’ or ‘domination of nature’ have been of great importance. A unifying element among ecologists is the belief that the Promethean project of mankind and modern attitude towards nature are the ultimate causes of ecological problems. From this assumption, they proceed to a rejection of the modern attitude towards nature and tend to embrace an eco-centric outlook. In their view mankind attempts to master nature have resulted above all in a destruction of the natural environment.’ (Grundmann 1991: 2)

From the perspective of acceptance, ‘domination’ embodies the meaning of dictatorship or authoritarianism, and is often interpreted as absolute manipulation to the servants from the masters. By contrast, ‘mastery’ is quite different from ‘domination’. Besides the meanings of reigning and overruling, it also includes the connotations of skill, proficiency, and controlling. As a result, ‘mastery’ could be interpreted as the reigning and controlling built on the basis of fully respecting and familiar with the objects. Therefore, although the two terms have the similar basic meanings, there are some subtle differences among them. Such a semantic difference might not be enough to construct the basis of our argument,¹ but it does provide a theoretical approach to solve our problems, that is to say, we can consider the concepts of ‘mastery over nature’ and ‘domination of nature’ as two distinct theoretical categories. This distinction has a key significance in our following analysis of Marx’s concept of ‘mastery over nature’.

First of all, **absolute domination** works like the master towards the servants. It is an arbitrary attitude of humanity towards nature that humans define their roles like the autocratic monarch to domineer over nature, attempt to dominate nature and make nature subordinate to themselves. Within such a framework of dominant relation, human beings actually consider nature as their own accessories. Whatever they do towards nature and no matter how they exploit nature is not subject to moral constraints. This is the common understanding to the term of ‘domination of nature’.

¹From the etymological perspective, ‘mastery’ derives from ‘master’. The latter word originates from the Middle Ages English ‘maistre’. ‘Maistre’ is the transformation of Latin word ‘magister’, which is the derivative of the adjective ‘magnus’. ‘Magnus’ refers to the persons, especially organisational leaders, teachers or overmen, who have a certain ‘large’ authority or power. ‘Domination’ derives from the Latin word ‘dominatio’. As a noun, ‘dominatio’ originates from the verb ‘dominor’, whose precursor is ‘dominus’. ‘Dominus’ also means host and governor. Therefore, ‘mastery’ and ‘domination’ are largely identical but with minor difference.

Secondly, **mastery with responsibility** shows the full respect for natural laws. It is Australian philosopher John Passmore who for the first time made the distinction between mastery and domination. He argued that besides the master-servant 'tyrant' dominant tradition, there is also a 'moderate' dominant tradition, namely, the tradition of stewardship and co-operation with nature. The so-called 'stewardship' means that the God entrusts the world to human beings, and let them become the steward of nature rather than dominate it. To be more obviously, human beings are just the administrator rather than the dominator of the earth.² As the administrator, we have to take on the corresponding responsibility of management, including the managed objects' welfare. As Socrates once pointed out that, the employable shepherds are those who treat the sheep well and raise the sheep to grow stronger; by comparison, the competent administrators are those who treat nature friendly. So-called 'to assist nature' means 'to help nature become sound' (Passmore 1974: 28). Nature itself is an original and defective formation; since human beings are the only kind of sensible animals on the earth, we have the responsibility to assist nature to evolve into a reasonable and completely realistic formation. In fact, the reasonable and completely realistic formation of nature is a status when nature best meets the human needs. Therefore, to make nature sound is to transform nature in conformity to the human purposes. However, this kind of transformation should imitate the outstanding sculptor to endow the fodders with humanistic form according to their original appearance and features based on the full understanding of these fodders. Thus, 'to assist nature' is different from either the mysticism which claims that humans should not interfere in nature or the 'absolute domination' theory which advocates that human beings could transform nature arbitrarily. 'To assist nature' is just in the middle of the two extreme percepts. Apparently, 'stewardship and co-operation with nature' is much more humble than 'absolute domination' in the attitude towards nature. Although it admits that humans could make use of nature, it does not recognise the metaphysical proposition that nature only exists for human beings' greed; although it acknowledges that humans are the administrator of nature, it at the same time stresses the importance of human beings' protective duty to nature, thus this management is a kind of 'mastery with responsibility'.

Then, in front of the environmental challenges, how should we make our choice between the two attitudes above? The former, 'absolute domination', is obviously the ideological cause leading to environmental problems, because it locates nature on such a low position only to exist and serve for human beings. Thus, there should be no controversy to exclude this position. However, for the latter, 'mastery with responsibility', we might draw different conclusions from different standpoints. If you are a radical eco-centrist, you will probably deny this position, for that 'mastery with responsibility' is still on the grounds of anthropocentrism; if you are a

² 'Stewardship' is a concept that has caused the largest amount of discussions in green religious theory. In the Christian history, what God entrusts human beings to be the trustee was the churches or those who need supervising, rather than nature. Since 1960s, in order to respond to the critiques from the environmentalists, some Christian researchers and clergies have enlarged the explanation of 'stewardship', that is to say, to expand the mandatory objects to natural objects, such as trees and rivers.

moderate anthropocentrist, you can not deny it easily, for that the management and utilisation of nature is also beneficial for environmental protection. For myself, I basically holds the latter position, that is to say, ‘mastery with responsibility’ is not the cause of environmental crises.

Marx and ‘Mastery over Nature’

There are two main arguments from the green theorists claiming that Marxism stands for ‘domination of nature’. The first argument, or the direct one, is that there are lots of discourses relating with ‘domination of nature’ in the works of Marx and Friedrich Engels. For instance,

It is neither the direct human labour he himself performs, nor the time during which he works, but rather the appropriation of his own general productive power, his understanding of nature and his mastery over it by virtue of his presence as a social body – it is, in a word, the development of the social individual which appears as the great foundation-stone of production and of wealth. (Marx 1981: 581)

The second argument is that Marx’s labour theory contains the logic of ‘domination of nature’. As mentioned above, ‘realisation of purpose’ is a significant dimension of Marx’s labour process theory. It consists of three points: firstly, natural objects will be transformed according to human’s purpose in labour process; secondly, nature is regarded as the labour objects and instruments in labour process, and is also considered as the sources of use-value and wealth; thirdly, humans achieve their own aims through working on nature. From the perspective of environmentalism, the three features of labour, ‘universality of objects transformation’, ‘nature as use-value’ and ‘implementation of purposeful awareness’ undoubtedly contain the implications to take advantage of nature from an anthropocentric standpoint. This implication in Marxism did not draw very much attention in its early developing stage, however, since the 1970s, along with the deterioration of environmental crisis and the flourishing of environmentalism, it has been regarded as the root of Marx’s view of ‘domination of nature’ by some green thinkers.

Judging from the first argument, since Marx did use the concept of ‘mastery over nature’, it seems quite reasonable to conclude that Marx is an advocate of ‘domination of nature’. However, it is inappropriate to infer the implications of Marx’s view of ‘mastery over nature’ and its relations with environmental thoughts just from several paragraphs of quotations, because Marx has discussed this concept in quite different occasions and contexts. Therefore, a correct answer to this question should come from the second argument, that is to say, to analyse Marx’s concept of nature in the theory of labour process, because only in this way can we make clear of the thinking logic of Marx himself and only through researching this question can we judge that whether Marx advocates ‘domination of nature’ or not.

Before making any final conclusion, we had better firstly take a look at the antecedent research of ‘mastery over nature’ by Alfred Schmidt, Howard Parsons and Reiner Grundmann. To my knowledge, the discussion of Marx’s ‘mastery over

nature' is originated from Schmidt's work. When Schmidt interpreted Marx's concept of nature, he touched upon the issue of 'mastery over nature' by chance. He wrote,

In later life he no longer wrote of a 'resurrection' of the whole of nature. The new society is to benefit man alone, and there is no doubt that this is to be at the expense of external nature. Nature is to be mastered with gigantic technological aids, and the smallest possible expenditure of time and labour. It is to serve all men as the material substratum for all conceivable consumption goods. (Schmidt 1971: 155)

From the statement above, it seems that the propositions of Marx are quite similar with those scholars advocating 'domination of nature'. However, Schmidt did not arrive at such a simplistic conclusion, instead, he put forwards that the basic contentions of Marx have two points different from other scholars. Firstly, Marx does not only emphasise on the technological 'mastery over nature' and the increasing amount of productivity, what he pays more attention to is the issue that in what kind of society can we carry out a reasonable mastery. In other words, Marx's 'mastery over nature' is conjoint with the whole development of human beings and the progress of production relations, aiming for the realisation of welfare for the whole human society. Secondly, Marx's concept of labour also contains the aspect of 'material metabolism'. From this perspective, nature has a property of non-identity with humanity. Even if nature has been incorporated into human society, it could not be placed under the mastery of humanity entirely.

The first point above can be used to illustrate the difference of Marx's 'mastery over nature' from other scholars, while the second point can provide a chance for us to have a clear understanding of whether Marx indeed advocates 'domination of nature' or not as well as to what extent. This is an issue with great significance, for it relates to how we evaluate the relations between Marx's theory and ecology. As a matter of fact, after Schmidt, most of the eco-socialists go ahead along the first clue, and unfortunately, the second clue has been overlooked by the majority of the eco-socialists.

The representative scholars along the first clue are Parsons and Grundmann. Parsons, as an orthodox Marxist, published his book *Marx and Engels on Ecology* in 1977, in which he came down to the issue of Marx's 'mastery over nature' from the perspective of environmental thoughts. Grundmann once launched a debate with Benton on the issue of 'mastery over nature' in *New Left Review* in the early 1990s. Based on this debate, Grundmann wrote his book *Marxism and Ecology* to make a brand new interpretation for Marx's view of 'mastery over nature'. Although the two scholars separated at intervals of almost 2 decades, they have done nearly the same job.

First of all, they have weakened the tendency of Schmidt to interpret Marx as an advocate of 'domination of nature' and corrected the fault that equates Marx's 'mastery over nature' with 'exploitation' and 'interference'. Grundmann also applied a comparison of a musician playing musical instrument to explain the meaning of Marx's 'mastery'. He wrote: 'It does not mean that one can behave in a reckless way towards it, in the same ways as we do not suggest that a mastery player dominates his instrument (say a violin) when he works upon it with a hammer' (Grundmann 1991: 61). In his point of view, Marx's 'mastery over nature' is based on the full respect for natural laws and to control nature in accordance with her inbeing.

Second, they have made a much clearer distinction between ‘mastery over nature’ of Marxism and ‘domination of nature’ of capitalism than Schmidt, asserting that the latter is the root cause of environmental damage. Parsons pointed out that, for Marx the aim of ‘mastery over nature’ is to meet the needs of all people under the precondition of maintaining the ecosystem in balance rather than to satisfy the ‘money-making’ purpose of small group ruling class. Grundmann further linked the concept of ‘mastery over nature’ with Marx’s communism, and advanced a very bold proposition: environmental damage is due to that humans have not truly realised the ‘mastery over nature’, and in order to prevent natural destruction, what we need to do is to strengthen our capacity of mastering the nature. Mastery in the communist society is the highest state for mankind to master over nature.

In conclusion, there are two main points in Marx’s concept of ‘mastery over nature’. First, it has no similarity with the absolute domination of master-servant relations. To this point, besides the justifications from Parsons and Grundmann, we can also find more evidences in the discourses of Marx and Engels. We know that the meaning of ‘mastery’ includes two dimensions. In addition to the meaning ‘to do something according to master’s own will’, it also embodies the meaning of ‘controlling the others to obey the master’s will’. According to the latter, if there is something without will, there will be no kind of obedience. Thus, the objects of mastery can only be the existence with will. In *Economic Manuscripts of 1857–1858*, Marx wrote:

Basically the appropriation of animals, land etc. cannot take place in a master-servant relation, although the animal provides service. The presupposition of the master-servant relation is the appropriation of an alien will. Whatever has no will, e.g. the animal, may well provide a service, but does not thereby make its owner into a master. (Marx 1976: 404)

Judging from this passage, Marx does not recognise a mastery relation between humanity and nature at all. So-called ‘mastery over nature’ only embodies some metaphor meanings. In addition, although Engels – as the ally of Marx – has many discourses relating with ‘mastery over nature’ (in fact, the majority of the critiques towards Marxism from the green theories are pointing to Engels), it does not mean that Engels recognises that humans can take advantage of nature in a plundering and ‘exploiting’ way. Engels once wrote:

We by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature – but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly’. (Engels 1972: 518)

In other words, if humans do not show their respect for natural laws, we will suffer from ‘the revenge of nature’, sooner or later. In this point of view, Marx and Engels’ concept of ‘mastery over nature’ can only mean to utilise nature in a rational way, obeying to the intrinsic laws of nature. The premise for such a kind of mastery is that humans have clearly realised that ‘man is just a part of nature’. If utilising the standards of classification we have discussed above, it is the ‘responsible mastery’ named by Passmore.

Secondly, Marx's 'mastery over nature' is not merely a question how to make use of nature in a rational way in accordance with natural laws. Moreover, it is also an issue concerning how to carry out a 'social criticism' in order to overcome the capitalist relations of production. This is a unique feature of Marx's theory. When Marx refers to the relations between 'realm of freedom' and 'realm of necessity' in *Capital* Vol. III, he wrote as follows:

Just as the savage must wrestle with Nature to satisfy his wants, to maintain and reproduce life, so must civilised man, and he must do so in all social formations and under all possible modes of production. With his development this realm of physical necessity expands as a result of his wants; but, at the same time, the forces of production which satisfy these wants also increase. Freedom in this field can only consist in socialised man, the associated producers, rationally regulating their interchange with Nature, bringing it under their common control, instead of being ruled by it as by the blind forces of Nature; and achieving this with the least expenditure of energy and under conditions most favorable to, and worthy of, their human nature'. (Marx 1983: 828)

Here, Marx not only affirmed the necessity for humans to make use of nature, but he also proposed that it is important to conduct 'reasonable adjustment' and 'common control' for the material metabolism between human beings and nature. Because the essence of material metabolism between human beings and nature is human labour, 'mastery' here can be understood as the regulation and controlling over labour as well as its performance forms, such as technology and productivity. In addition, Marx has brought forwards some specific conditions to realise this aim, that is to say, 'the associated producers', 'achieving this with the least expenditure of energy' and 'under conditions most favorable to, and worthy of, their human nature'. Apparently, all these conditions contrapose to capitalism. In capitalist system, due to the unlimited pursuit of profits by capital and brutal market competition, the productivity and technology tends to develop with a trend of 'natural growth', which can not be controlled effectively by society. In communist system, however, the comprehensive development of humans will provide a prerequisite for society to regulate human behavior in a rational way and accordingly society has the capacity to control the trend of 'natural growth' within the range of natural tolerance. In short, the premise of so-called 'mastery over nature' advocated by Marx is the transformation of capitalist production relations. In the author's point of view, this is also the very reason why Marxist approach to deal with environmental issues is referred to eco-socialism or eco-Marxism.

These two conclusions above are commonly accepted by the majority of the eco-socialists or eco-Marxists. But, it is undeniable that these two points are still based on the judgment that Marx alleges 'mastery over nature', which very easily leads to classify Marxism into the category of anthropocentrism. Needless to say the green theorists, in fact, except for few Marxists such as Ernst S. Bloch,³ Foster, etc.,

³In *Principle of Hope*, Bloch interpreted Marx from the natural philosophy perspective of Friedrich W. J. Schelling and from the German Romanticism, illustrating nature as a 'nature as subjectivity' with a mysterious color while also stressing the conformity of humanity and nature and the root-source of nature.

the majority of the eco-socialists have admitted this judgement openly. For instance, Grundmann asserted that 'it is plain that Marx had an anthropocentric world-view and did not set up moral barriers to the investigation of nature. He was clearly a follower of Enlightenment thinkers like Bacon and Descartes' (Grundmann 1991: 58).

However, such an interpretation to Marx's environmental thoughts will be faced with an unavoidable problem: the fundamental value-orientation of environmentalism is its anti-anthropocentrism, and what the green theory critics and even the left-wing thinkers such as Benton criticise Marx furiously is exactly his anthropocentrism. Although we can say that Marxism is not an ordinary kind of anthropocentrism, but a kind of anthropocentrism beneficial for the majority of humans, this defense can hardly make the critics convinced. From this point of view, to demonstrate the compatibility of Marxism with ecology, it is necessary to show some evidences that Marx does not advocate 'mastery of nature'. Fortunately, we can find such evidences precisely from Marx's theory of labour process which is besieged by the critics.

'Material Metabolism' and 'the Root-Source of Nature'

As a matter of fact, 'material metabolism', the other key understanding in Marx's concept of labour process has not been received due attention for a long time. The reason why this situation exists is mainly due to the subjective initiative feature of labour itself as well as the limitations of labour view framework in modern times established by Adam Smith and Hegel. However, along with the ever increasing study of relations between Marx and environmental thoughts, the concept of 'material metabolism', as M. Fischer-Kowalski has observed, is becoming 'a rising star of new concept' (see Foster 2000: 162). Schmidt is probably the first scholar discussing this concept, who extracted it from Marx's economic works in 1962. Thereafter, eco-socialists in the West such as Parsons, Grundmann, David Pepper, Tim Hayward, Paul Burkett and so on, have also gotten involved with this research. Regrettably, all of them did not contribute much new thinking to this concept. By comparison, eco-Marxists in Japan have achieved a lot in this field, mainly contributed by Shigeaki Shiina, Fumikazu Yoshida, Kirirou Morita, Naomichi Hayashi, Shigeru Iwasa, Takashi Shimazaki, Jyun Takada and so on.

'Material metabolism' is the translation of the German term 'Stoffwechsel'. In German, 'Stoff' means substance, material and fodder, and 'wechsel' means interchange and transform. From the literal perspective, 'Stoffwechsel' means the interchanging and transforming process of substance, material and fodder between two things. If we apply Aristotle's 'matter-form' framework to illustrate this concept, 'Stoffwechsel' is the 'matter interchange' compared to the 'form interchange', and we can call the connotation of 'matter interchanging' as philosophical 'Stoffwechsel'. However, such a literal combination meaning is not the only implication of this term. This concept was first put forwards by chemist G. C. Sigwart in 1815, and it has been prevailing in physiology, chemistry, agriculture and other natural science fields in the modern times.

'Stoffwechsel' here does not mean material interchanging in the common sense, but metabolism in the sense of physiology as well as life circulation in a broad sense of ecology. So-called metabolism refers to assimilation and alienation activities of living bodies for sustaining and maintaining the living existence; so-called life circulation refers to the interdependence relations in the food chains and ecosystems in which include animals, plants, microorganisms, and human beings. Accordingly, we can call the connotation of 'material metabolism' as 'Stoffwechsel' of natural science.

The reason why Marx's concept of material metabolism has received the good graces by the scholars mentioned above is due to the twofold meanings of it. On one hand, material metabolism is a concept of natural science, especially a physiological concept. If taking this concept as a basis, Marx's illumination on the relations between humanity and nature will appear a strong sense of environmentalism, enabling him to criticise capitalism from an ecological perspective. On the other hand, material metabolism as a philosophical concept also means 'matter interchanging', which enables Marx to observe nature in a unique way. For instance, he puts more emphasis on the root-source and non-dominant feature of nature, which is different from most of the scholars in modern times.

Material Metabolism in the Sense of Natural Science

Marx has once used the concept of material metabolism for several times in *Capital*, *Outline of Economics Critiques* (*Economics Manuscripts of 1857–1858*) and other works, but he did not make detailed explanation for this concept. So, in what exact sense does Marx apply it? Schmidt, Shigeaki Shiina, Fumikazu Yoshida and other scholars have conducted a lot of study on this issue. Although they have bifurcations on the question that Marx's concept of material metabolism derives from Jacob Moleschott and Ludwig Büchner or from Justus von Liebig, what they are in common is that it is a concept in the sense of natural science.

First of all, they all agree with that Marx used this concept in the sense of physiology. On this point, Schmidt has a wonderful comment:

The description of the labour process as the the metabolism between man and nature, as it dominates the preliminary studies and the final version of *Capital*, belongs to the physiological rather than to the social sphere. ...[Marx] understood the concept of metabolism not only metaphorically but also in an immediately physiological sense. (Schmidt 1971: 89)

Indeed, from Marx's own usages, such as 'metabolism between man and nature', 'metabolism between man and land', as well as from his critiques to the capitalist production mode which leads to the depletion of land fertility and the 'disturbance' of metabolic process, we can draw a conclusion that the standpoints of Schmidt is correct.

In the second place, Marx uses this concept in a broader sense of natural life circulation. Labour, or say more broadly, production and human life of consumption are only part of a large circulation constituted by fauna and flora. No matter how great and supernatural they look like, they can not undermine the life circulation

of nature. In the following critiques of Marx on capitalism the concept of material metabolism is exactly used in this sense:

Capitalist production, by collecting the population in great centres, and causing an ever-increasing preponderance of town population, on the one hand concentrates the historical motive power of society; on the other hand, it disturbs the circulation of matter between man and the soil, i.e., prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil. (Marx 1969: 528)

Some years ago, Japanese scholar Naomichi Hayashi once said that Marx ‘penetrates an insight in a talented way into’ the capitalist essence of natural destruction, and commented ‘this insight is really acclaimed as the peak of perfection’ (Hayashi 1972: 14). Taking this point as a basis, later Burkett made an argumentation of the contradiction between ‘capital and nature’, and Foster further observed that Marx has grasped ‘the nature of sustainable development concept’ in about 100 years ago. Indeed, these contentions of Marx could be favorably compared with the views of outstanding eco-socialists and eco-Marxists today.

Labour Process as Material Metabolism

Marx does not only apply the concept of material metabolism to the critiques of capitalism, but also introduces this concept to the definition of labour process. In the author’s point of view, it is this seemingly featureless introduction that has endowed Marx’s concept of labour with the ecological implication, distinguishing itself from the definitions of economists and philosophers in the modern times.

First of all, compared with the dimension of ‘realisation of purpose’ mentioned above, labour’ dimension of ‘material metabolism’ embodies much more significance. In the understanding of ‘realisation of purpose’, humans’ labour behavior is a kind of formalising activity to endue the objects with humanistic forms. Through the humanistic production activities to transform the natural objects, humans realise their own targets or aims. During this process, the original forms of natural objects are replaced by the humanistic forms, and the natural objects themselves undergo a process of formalisation, namely ‘form interchanging’. Thus, the whole process presents a strong tendency of subjectivity. However, if defining labour process as ‘material metabolism’, labour itself is no longer ‘a formalising activity to endue natural objects with humanistic forms’. Rather as Schmidt has pointed out, just like humans penetrate through natural materials, nature as use-value also penetrates through humans, thus labour is a process of ‘matter interchanging’ which starts from and returns to nature.

In the relation between ‘matter and form’, Aristotle advocates that form has precedence over matter from the standpoint of idealism; while Marx advocates that matter takes precedence of form, and matter is the foundation of formalisation from the standpoint of materialism. In the labour process theory, Marx holds this position and emphasises the fundamental importance of ‘matter interchanging’ ‘form interchanging’, a basic feature of Marx’s labour concept which distinguishes him from other idealist scholars. Schmidt is still the first person who has noticed this feature.

He wrote: 'the *material* side of the metabolism between man and nature emerges more sharply in Marx, notwithstanding his recognition of the historical mutability of its formal determinations' (Schmidt 1971: 90). Of course, the aim of Schmidt emphasising on this point is not to explore the contemporary ecological implication of Marx's theory, but to reveal the self-contradiction of Marx's nature concept. In Schmidt's own words, 'it, for all its scientific air, is none less speculative in character' (Schmidt 1971: 76).

Then, what are the implications of this 'matter interchanging' thought for modern environmentalism? Although Marx said that labour is 'the living fire of creation' (Marx 1976: 272), just like the form cause put forwards by Aristotle, however, any kind of humanistic form is temporary and accidental compared with natural substances. The formalised natural substances will remain their independence with obstinacy rather than being dissolved by the form. In other words, although natural substances and humanistic form are two basic elements of labour, these two elements are transeunt and independent. To illustrate this point, Marx once applied an example of table production in *Capital*: timber can be produced into table by labour (Marx 1969: 85). During this process, although the form of timber has been changed, its substances still remain the same. As the combination of labour (form) and timber (matter), if the table is out of use for a long time and is accordingly at the disposal of 'destructive power of natural material metabolism' (Marx 1969: 198), along with the passage of time, the wood will become decayed and the metal will get rusted, and eventually the table will return to nature by the erosion of natural forces. The form of table will have disappeared, but the matter still exists. In this sense, labour can only change the natural forms rather than the natural substances. Just as Marx said, 'the labour can work only as Nature does, that is by changing the form of matter. Nay more, in this work of changing the form he is constantly helped by natural forces' (Marx 1969: 57f).

Labour representing the subjective force of humans can not determine the fate of matter representing of the natural material force. Natural substance has a kind of 'intractability' which can not be dominated by human society and labour subjects. Marx called this 'intractability' as 'material indifference to the form' (Marx 1976: 271), and Schmidt ever titled it as 'non-identity' of subject and object (Schmidt 1971: 74). Responding to the critiques from the ecological scholars, we can regard it as 'non-dominance of nature'. Benton once criticised that Marx only focuses on 'intentional structure' and 'manufacturing transformation labour' in his theory of labour process, and therefore he is an advocate of 'domination of nature'. From the previous analysis, however, we can reasonably say that the criticism of Benton is shooting pointless.

Skepticism for the Material Metabolism Theory

From the discussion above, it is justified to make an ecological interpretation for Marx's labour theory through the concept of material metabolism. But unexpectedly, Schmidt, as the first scholar noticing that Marx brings the concept of material

metabolism into the labour process, did not go further to link this idea with environmental thoughts. Instead, it is Japanese scholar Kirirou Morita who is aware of this point keenly and applies it into the environmental analysis.

Kirirou Morita advanced this question through the way of skepticising the labor process theory. In his point of view, if to grasp the meaning of labour process according to material metabolism in the sense of physiology, the labour process should be like the metabolic process of living body, including not only the assimilation of external things (nature \Rightarrow humans), but also the dissimilation of excreting the acquired things to the external environment (humans \Rightarrow nature). If the process above corresponds to the manufacturing and consumption of products, the former is 'nature \Rightarrow humans' process of acquiring products, while the latter is 'humans \Rightarrow nature' process of consuming products and abandoning wastes, or a process of the products returning to nature. However, one might find that 'in *Capital*, the labour process theory has only analysed the former assimilation stage of acquiring the products' (Morita 1976: 48), but did not go further to address the latter dissimilation stage. How is this going on? Kirirou Morita himself disagrees with the conclusion above and does not think it is justified to hypercriticize Marx by this defect: because the dissimilation discourses of Marx can be found in *The Outline of Economics Critiques*, and the dissimilation part belongs to consumption behavior out of labour process and thus should be analysed through an entire production process (production – circulation – consumption).

However, this seemingly resolved issue has recently attracted scholars' attention again. Jyun Takada raised almost the same question as Kirirou Morita in his paper 'the material metabolism in Labour and the material circulation in nature'. He pointed out that, 'if we understand material metabolism by the model of assimilation-dissimilation, then the conclusion has no option but to admit that Marx is in want of the survey on dissimilation dimension, and his discussion on material metabolism in the labour process is one-sided' (Takada 2004: 35–36). Indeed, in the labour process chapter of *Capital*, we could not find the discourses of 'consuming the products and abandoning the wastes'. In this strict sense, the critiques from Kirirou Morita and Jyun Takada are correct, that is to say, 'there is not a corresponding side of dissimilation' in the labour process chapter.

However, 'assimilation and dissimilation' is only a metaphor here, which is merely to stress the two directions of 'nature \Rightarrow humans' and 'humans \Rightarrow nature' mentioned above. Moreover, if we read the labour process chapter of *Capital* with care, we will find that the theoretical framework used by Marx is 'matter and form' rather than 'production, consumption and abandonment of the products'. If we illustrate the two directions of labour process according to the framework of 'matter and form', natural substances are endowed with humanistic forms can be regarded as the 'nature \Rightarrow humans' process, and the formalised natural substances still carry on 'self-implementation' with obstinacy can be regarded as the 'humans \Rightarrow nature' process. Accordingly, the entire labour process presents a 'matter interchanging' of 'matter \Rightarrow form \Rightarrow matter' or a 'material circulation' of 'nature \Rightarrow man \Rightarrow nature'. Therefore, as long as we do not merely understand 'assimilation and dissimilation' as the 'manufacturing, consumption and abandonment of products', the labour

process understanding of Marx's material metabolism is complete and logical, and the questions such as 'one-sidedness' and 'absence of the corresponding side of dissimilation' raised by Kirirou Morita and Jyun Takada will disappear.

In summary, if we see the process of 'dissimilation' or 'humans \Rightarrow nature' as the self-implementation of natural substance, we can eliminate the skepticism from Kirirou Morita and Jyun Takada. In fact, it is that Marx has introduced material metabolism in this sense to the definition of labour process which makes his views of labour distinguish from the idealistic scholars such as Hegel. Jyun Takada has noticed the questions such as matter interchanging, form transformation and the root-source of matter vs. form in the labour process understanding. Furthermore, Kirirou Morita has mentioned that the labour definition in the perspective of material metabolism 'requires us to reflect our traditional understanding of labour, which overemphasises on the human subjectivity as well as the realisation of human purpose' (Morita 1976: 49). Unfortunately, both of them seem to be obstinate to understand 'dissimilation' in a narrow sense as 'the consumption and abandonment of products'. Therefore, they are trapped in a dilemma on this issue: affirming the significance of material metabolism concept, while at the same time accusing the incompleteness of Marx's labour process theory.

Conclusion: For a Perspective of Materialist Dialectics

We have discussed the twofold definitions of Marx's labour process as well as the two kinds of derived evaluations. Then, why does the same labour process result in two totally contrary conclusions? How can we integrate the two approaches of thinking together?

This issue has once brought a great distress on Schmidt. In his book *The Concept of Nature in Marx* published in 1962, he first put forwards the well-known assertion that 'it is the socio-historical character of Marx's concept of nature which distinguishes it from the outset' (Schmidt 1971: 15). According to this well-known assertion, Marx's nature concept mainly refers to the nature, which enters into human practical fields as objects and use-values of economic and technical activities and has the 'feature of non-ontology' (Schmidt 1971: 19). On the contrary, the nature concept of Engels' dialectics of nature as well as the Soviet Union Marxist philosophy based on dialectics of nature refers to 'the nature before naissance of human beings' and 'the nature separating from human social practice'. In other words, it is an 'ontological definition' in the sense of fontal world. Schmidt argued that, different from Engels, the nature concept of Marx is a 'social-historical' rather than 'ontological' concept.

However, during the process of unwinding Marx's nature concept, Schmidt raised the above-mentioned theories again such as the concept of material metabolism, the 'indifference' of natural substance to form', and the 'non-conformity of subject and object', to demonstrate the difference of nature views between Marx and Hegel, Georg Lukacs, Bloch and others. In accordance with these concepts and thoughts, nature is obviously not a 'social-historical concept' corresponding to

human labour, but an 'ontological concept' which Schmidt did his utmost to oppose. As a result, the elaboration of Schmidt includes two quite contrary conclusions of 'social-historical nature' and 'ontological nature' at the same time. Confronted with this evident logical contradiction, Schmidt has once made illustrations on this issue twice in the 'English version preamble' and 'postscript' of his book *The Concept of Nature in Marx*.

This is in full awareness of the contradiction between emphasizing the 'non-ontological' character of Marxist materialism and then introducing the term 'negative ontology': this is a contradiction within the facts, not an error to be eliminated by changing a word, or the result of a logical inconsistency. (Schmidt 1971: 11)

In other words, from the point view of Schmidt; this contradiction is not the result of his own interpretation, but rather the inherent contradiction of Marx's theory.

From the defense of Schmidt, he does not look upon 'the social-historical concept' and 'the feature of ontology' of nature equally. He merely acknowledges the concept of nature in the sense of ontology 'negatively'. He regards it as Marx's 'inherent natural speculation' and 'hidden natural speculation' with derogatory sense. On the contrary, he puts much more emphasis on 'the social-historical concept', and considers it as the fundamental difference between Marx and other scholars on the concept of nature. Therefore, in fact he tries to eliminate this logical contradiction by carrying out the conclusion of 'social-historical concept' forcefully.

Although the defense of Schmidt is painstaking, it seems a failure from the author's point of view. So-called logical contradiction in Marx's nature concept is not an inherent contravention of Marx's theory itself, but it is nothing other than the interpretation contradiction of Schmidt. Marx himself did not like Schmidt to define nature simply as 'a social-historical concept'. Contrary to Schmidt, Marx stands on the position of materialism, setting out from 'the root-source of nature' and then moving to the 'social-historical nature'. Even when he brings nature into the social-historical field, he still lets natural substances keep their own properties and allows the 'indissolubility' between humanity and nature to maintain. This can be called **the materialistic truth**. Furthermore, Marx does not stop at such an understanding instead go further. From the view of Marx, 'nature as the root-source' can also move forward by itself and divide into two parts of human beings and natural substances. These two parts reunite by endowing natural 'substance' with humanistic 'form' in the labour process. In other words, when nature as the root-source develops into humans' self-consciousness, it will lead to opposition between humanity and nature. At the same time, nature also combines with itself together through humans' theoretical and practical activities. Marx is always trying to conduct a dialectical unity between the two parts by the logic of 'internal mutual infiltration of nature and society within the natural macrocosm'. This can be called **the truth of dialectics**.

The combination of materialism and dialectics is the materialist dialectics; and it is from the perspective of materialistic dialectics Marx constructs his concept of nature. Only in this way, can the seemingly contradictory 'nature as the root-source' and the 'social-historical nature' be reunited. The reason why Schmidt is trapped in the predicament and could not extricate himself from it is that, he insists doggedly the false cognitions such as 'there is no dialectics in nature' or 'there is

no compatibility of materialism with dialectics'. Had he realised the significance of materialist dialectics, he would have probably drawn quite different conclusions.

Finally, let us back to the theme of this chapter, 'ecology and Marx's labour process theory'. On the surface, the twofold logic and evaluations of Marx's labour concept seem contradictory. If seen from the perspective of materialist dialectics, however, it is a kind of unity at a higher level rather than a contradiction any longer, namely, a dialectical unity of 'realisation of purpose' and 'material metabolism' based on 'nature as the root-source'. Therefore, Marxist methodology on environmental issues can neither be 'natural-centrism' or 'life-centrism' nor 'technology optimism' or extreme 'anthropocentrism'; rather, it should be a materialist dialectic theory which has abandoned the inherent confrontation between and achieved the dialectical unity of them. To quote the words from *Economic and Philosophical Manuscripts of 1844*, that is the unity of 'humanism' and 'naturalism'. In his book of *Eco-Marxism*, Takashi Shimazaki argued that the fundamental feature of Marxism is 'a unified ecology which inherits and develops the tradition of 'materialism' and 'dialectics' since the ancient Greek times' (Shimazaki 2007: 25–26). This chapter can be regarded as a proof for this argument. In addition, it also aims to be a primary argumentation for the ecological possibility of materialist dialectics.

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