

# The specificity of manufacturing in Marx's economic thought

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## ABSTRACT

The manufacturing sector has traditionally been regarded, particularly in development economics and in the Kaldorian literature, as having a 'special role' as an engine of growth. This article examines Marx's approach to manufacturing, and the extent to which manufacturing could be considered to have a special place in Marx's economic thinking, especially in relation to accumulation and growth. It is demonstrated that the precursors of a number of the important ideas in non-Marxian heterodox economics concerning the special properties of manufacturing may actually be found in Marx's texts. The important 'progressive' features of manufacturing identified by Marx include: division of labour; socialisation of labour; mechanisation; increasing returns to scale; learning-by-doing; technological advancement; and overall, superior potential for cumulative productivity increases. But in a difference with Kaldorian-type approaches, for Marx these properties are not only sector-based. We thus suggest an interpretation of Marx as having a two-dimensional conceptualisation of activity-specificity, with sectoral and 'technological-organisational' dimensions.

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## 1. INTRODUCTION

Development economics, as well as structuralist economics and much of heterodox economics, have traditionally been strongly influenced by a view that the manufacturing sector has a special role to play as an engine of economic growth. Such an approach is

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probably most prominently associated with Nicholas Kaldor and the school of thought associated with him. Kaldor argued that growth in productivity and output in the rest of the economy are a function of growth in manufacturing.

In Marx's economics – developed about a century before Kaldor's seminal contributions in this regard – 'sectors' such as manufacturing are not the basic categories of analysis. Nonetheless, Marx does discuss manufacturing at some length, particularly in the context of his treatment of the production of relative surplus-value. This article investigates the extent to which a conceptualisation of the 'specificity' of manufacturing can be discerned in Marx's thought. 'Specificity' refers here to an idea that there is something specific or special about the manufacturing sector in relation to the growth process, such that a unit of manufacturing is likely to make a greater contribution to long-term growth than a unit of production in, for example, agriculture or services.

The next section reviews approaches to the specificity of manufacturing in the non-Marxian literature, particularly in the Kaldorian tradition. Section 3 analyses Marx's treatment of manufacturing, particularly in terms of the 'specificity' of manufacturing for accumulation and growth. This analysis draws on a close reading of relevant passages from *Capital* (particularly Volume 1, and also Volume 3) as well as from *Grundrisse*, *The German Ideology*, the *Communist Manifesto*, *Wage-labour and Capital*, and *Theories of Surplus Value*. Section 4 concludes.

## **2. THE 'SPECIAL ROLE' OF MANUFACTURING IN NON-MARXIAN HETERODOX ECONOMICS**

Whether and in what ways sectoral structure matters for growth is an old debate in development economics and in the growth literature, as well as in policy debates. The classical development economics literature, structuralist thought, and the Kaldorian-type tradition in heterodox economics<sup>1</sup> emphasise the sector-specificity of the growth process. It is argued that there is a strong relationship between changes in the sectoral composition of an economy and its rate of growth. This implies that a unit of value added is not necessarily equivalent across sectors in terms of its growth-inducing or growth-enhancing effects.

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<sup>1</sup> Note that these are not mutually exclusive schools of thought.

More specifically, it is the manufacturing sector which is regarded (in these types of approaches) as having special growth-enhancing characteristics that are not shared by the other sectors, or at least not to the same extent for the sector as a whole. These characteristics accord manufacturing a central role in the economic growth process (as well as suggesting that from a policy perspective there should be a particular focus on the manufacturing sector). Apart from Kaldor, seminal contributions in these schools of thought regarding the specificity of manufacturing in growth have come from among others Verdoorn, Kalecki, Hirschman, Prebisch, Pasinetti, Young, and Thirlwall.

In some sense Kaldor's contribution might be regarded as formalising and rationalising the empirical regularities and stylised facts discussed by Kuznets and developed and tested by *inter alia* Chenery and Taylor (1968) and Chenery and Syrquin (1975). To this Kaldor added an analysis of why manufacturing has such special qualities relevant for growth.

Kaldorian refers here to the 'laws' that Kaldor advanced as explaining the differences in rates of growth internationally, and the approach that developed out of these 'laws'.<sup>2</sup> The first law states that the faster is the rate of growth in manufacturing, the faster is the rate of growth of the economy as a whole (in a fundamental causal sense associated with rates of productivity). The second law, also known as Verdoorn's Law, is that the growth rate of labour productivity in manufacturing is endogenous to the growth rate of manufacturing output, in a causal sense deriving from returns to scale. According to the third law, aggregate productivity growth is positively related with the growth of manufacturing output and employment and negatively related with non-manufacturing employment.

Several key special characteristics typically attributed to the manufacturing sector can be identified. Crucial is the idea that manufacturing growth 'pulls along' aggregate economic growth in ways that growth in other sectors of the economy does not.

One dimension of this is Hirschmanian-type backward and forward linkages between manufacturing and other sectors of the domestic economy. If these are indeed stronger than for other sectors of the economy, then manufacturing growth can exert a particularly powerful pulling effect on the economy.

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<sup>2</sup> See Thirlwall (1983, 2003) for a full explication of Kaldor's laws.

Another channel through which manufacturing can act as an engine of growth relates to dynamic economies of scale. Dynamic economies of scale in manufacturing would mean that the growth of productivity in manufacturing is higher the higher is the growth in manufacturing output. Learning by doing, innovation, spill-over effects, and intersectoral linkages are considered particularly strong in manufacturing, rendering overall productivity growth endogenous to growth in dynamic manufacturing sectors. This means that expanding the manufacturing sector would raise manufacturing (and non-manufacturing) productivity.

It is also argued that most technological change occurs in the manufacturing sector. Furthermore, much of the technological change that does occur in the rest of the economy is regarded as tending to be diffused out from the manufacturing sector, in part through the use of higher productivity manufacturing inputs in the rest of the economy.

Finally, due to issues of import elasticities (both income and price), manufacturing is considered critical to alleviating balance of payments constraints that can impose a 'stop-go' pattern on developing countries' growth. This is important in supporting sustained high growth rates, particularly in the absence of a strong primary commodity export sector with stable and favourable terms of trade.

To the extent that these special properties of manufacturing hold, this would imply that an intersectoral shift of employment (or similarly of other resources) may potentially increase aggregate productivity. This is particularly the case insofar as the growth-supporting externalities of these characteristics are not fully reflected in relative prices, such that a market-based 'equilibrium' sector structure can be sub-optimal for growth.

Manufacturing, and the acceleration of industrialisation in primary commodity-exporting economies, was a central focus of the structuralist approach associated with the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) in the 1950s and 1960s.<sup>3</sup> From this perspective, growth in developing countries is constrained by the differential income elasticities of the imports of developed and developing countries, such that the growth rate in the centre will dictate the limits to growth in the periphery through

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<sup>3</sup> See Blankenburg et al (2008).

balance of payments constraints. Industrialisation is the only way for developing countries to catch up. Growth in developing countries is thus considered sector-specific (with a special role for manufacturing) in two main ways. On the demand side, industrialisation is necessary to overcome the balance of payments constraint on growth. On the supply side, manufacturing is regarded as a leading sector in the Kaldorian sense. The structuralist approach therefore emphasises the priority of industrial development in the periphery, rather than a reliance on primary commodity exports.

### **3. A 'SPECIAL ROLE' FOR MANUFACTURING IN MARX'S THOUGHT?**

In Marx's analysis of the development of capitalism, he uses the term 'manufacture' (or *manufaktur*) to refer to manufacturing not as a sector as in current usage, but rather as a stage in between simple co-operation/handicrafts and modern machine industry. For heuristic purposes, Marx's narrow meaning of manufacturing as a historical stage in between simple co-operation of modern machine industry will be denoted here using Marx's original term of *manufaktur*, to distinguish it from manufacturing more broadly. The interest here is not the specificity of *manufaktur* as a stage in the development of manufacturing, but rather manufacturing as a whole in the current sense; this Marx generally refers to (sometimes with the inclusion of mining) as industry.

We begin, in section 3.1, by reflecting on Marx's historical account of the development of manufacturing and the implications of this for economic transformation and the advancement of capitalism. In the core analysis of this article, Section 3.2 then draws out what Marx seems to have regarded as the special characteristics of manufacturing, and the relevance of these characteristics for the dynamism of capitalism. It is shown that the precursors of a number of the ideas in non-Marxian heterodox economics concerning the special properties of manufacturing may actually be found in Marx's work (particularly in the first volume of *Capital*). Section 3.3 puts forward an interpretation that Marx's insights regarding manufacturing can be conceptualised in two dimensions, one sectoral and another which may be shorthanded as 'technological-organisational'.

### 3.1 The development of manufacturing and the progress of capitalism

Handicraft (*handwerksindustrie*), simple co-operation, *manufaktur*, and modern machine industry are not an entirely teleological series of categories, in that these 'modes' can and do exist simultaneously. Nevertheless, Marx conceives of them as essentially sequenced in terms of historical development, with the prominence of one mode being supplanted by the next. The scale, complexity, division of labour, and degree of technological advancement increases with the progression between these stages.

*Manufaktur* is distinguished from earlier stages by the organisation of workers into a single unified process of production of a commodity. In this regard Marx uses the example of the production of a carriage, where different workers or groups of workers are engaged in different tasks in the manufacture and assembly of the various component parts of a carriage. Thus Marx states that 'the collective worker, formed out of the combination of a number of individual specialized workers, is the item of machinery specifically characteristic of the manufacturing period.' (Marx, 1867b, p.468).

Modern machine industry is distinguished from earlier stages by the fact that the production process is structured around machines rather than around human labourers, and that 'in handicrafts and manufacture, the worker makes use of a tool; in the factory, the machine makes use of him.' (ibid, p.548). Marx describes a 'real machine system' – as opposed to simply a collection of independent machines – as one where 'the object of labour goes through a connected series of graduated processes carried out by a chain of mutually complementary machines of various kinds. Here we have again the co-operation by division of labour which is peculiar to manufacture [*manufaktur*], but now it appears as a combination of machines with specific functions.' (ibid, p.501). Elsewhere he characterises big industry as 'the application of elemental forces to industrial ends, machinery and the most complex division of labour' (Marx, 1845, p.56).

Modern machine industry transcends the limitations of *manufaktur* associated with certain of its distinctive features, specifically the reliance of *manufaktur* on human beings. It is to this difference that Marx alludes when he distinguishes *manufaktur* and modern machine industry in terms of the 'subjectivity' of the former and 'objectivity' of the latter. Modern machine industry requires the production of machinery by machinery (as opposed to the

production of machinery or tools by hand as in *manufaktur*) for its full development. Without this key characteristic it would remain constrained by human limitations and 'subjectivity' in production of machinery.

The development of modern machine industry is central to Marx's understanding of the advancement of capitalism, and also of the dynamism and revolutionising forces that capitalism brings. To the extent that Marx regards capitalism as a progressive historical force, this progressivity is strongly associated with the development of modern machine industry.

The advancement of manufacturing undermines pre-capitalist or non-capitalist modes of production, through various channels. Technological progress and the increasing cost of constant capital requirements for competitive survival that are associated with the rise of manufacturing make it increasingly difficult for individual workers (especially without access to finance) to afford the means of production required for engaging in the ancient mode of production. This pushes them towards selling their labour power to a capitalist. Furthermore, the narrowing of skills in manufacturing, due to division of labour and specialisation, make it particularly difficult for a manufacturing worker to leave wage employment and take up the ancient mode of production, even in the same line of activity. Economies of scale in manufacturing also undermine the ancient mode of production in manufacturing and support the development of capitalist manufacturing, as well as increasing the concentration of ownership and control.

Discussing the emergence and effects of 'big industry' in *The German Ideology*, Marx describes how the rapid development of manufacturing in England 'called into existence the third period of private ownership since the Middle Ages.' (Marx, 1845, p.56). The development of manufacturing is thus important not only in terms of the development of the productive forces, but also as a motive force of capitalist development. Marx also points to the impact of the rise of industry in revolutionising various aspects of the economy as well as in subordinating other forms of capital:

Big industry universalised competition..., established means of communication and the modern world market, subordinated trade to itself, transformed all capital into industrial capital, and thus produced the rapid circulation (development of the financial system) and the centralisation of capital. (ibid).

Marx emphasises in dramatic terms the historical role of big industry in transforming not only on the economy but virtually all aspects of society:

By universal competition it forced all individuals to strain their energy to the utmost. It destroyed as far as possible ideology, religion, morality, etc., and where it could not do this, made them into a palpable lie. It produced world history for the first time...It made natural science subservient to capital and took from the division of labour the last semblance of its natural character...In the place of naturally grown towns it created the modern, large industrial cities which have sprung up overnight. Wherever it penetrated, it destroyed the crafts and all earlier stages of industry. It completed the victory of the commercial town over the countryside... (ibid, pp.56-7).

An important transformative quality of large industry is the shift to the production of not only use-values but of exchange-values, and this is critical to the development of capitalism. There is a dialectical relationship between the expansion of large-scale manufacturing and the advancement of capitalism. The development of large-scale manufacturing commodity production would not be feasible under pre-capitalist relations of production, yet the development of manufacturing undermines those relations and facilitates the rise of capitalism.

The first presupposition of [large industry] is to draw the land in all its expanse into the production not of use values but of exchange values. Glass factories, paper mills, iron works etc. cannot be operated on guild principles. They demand mass production; sales to a general market; *monetary wealth* on the part of their entrepreneur – not that he creates the conditions, neither the subjective nor the objective ones; but under the old relations of property and of production these conditions cannot be brought together. – The dissolution of relations of serfdom, like the rise of manufacture, then little by little transforms all branches of work into branches operated by capital. (Marx, 1857, p.511).

Competition is a central force in Marx's account of the development of capitalism as well as the ongoing dynamic character of capitalism. There is in turn a relationship between competition and mechanisation. Manufacturing is integral to mechanisation, in terms of the rise of the manufacturing sector itself as well as the role of manufacturing in the mechanisation of the rest of the economy. Competition both drives and is spurred on by mechanisation.

While competition...constantly pursues him with its law of the cost of production and turns against himself every weapon that he forges against his rivals, the capitalist continually seeks to get the best of competition by restlessly introducing further subdivision of labour and new machines which, though more expensive, enable him to produce more cheaply, instead of waiting until the new machines shall have been rendered obsolete by competition. (ibid, p.44).



Competition accelerates the division of labour and the application of machinery. The relationships between mechanisation, competition, and the development of capitalism give particular importance to the development of manufacturing, given that it is manufacturing that is the basis of mechanisation.

Overall, Marx attributes a historically progressive role to manufacturing, a conception on which Lenin subsequently builds.<sup>4</sup> In the era in which Marx wrote, these progressive qualities of industry were juxtaposed to agriculture and to handicrafts, and to a limited extent to the services activities of the time. Marx sees a relationship between the development of manufacturing and the development of capitalism. In his Preface to the First Edition of Volume 1 of *Capital*, for instance, Marx states that ‘the country that is more developed industrially only shows, to the less developed, the image of its own future’ (Marx, 1867b, p.91). This relationship is not merely one of historical correlation, but one dialectically conceived of in terms of mutual causality. This will be discussed further below, but as this point it is worth quoting Marx’s analysis of the relationship between industry, commerce, the development of capitalism, and economic growth:

The world market itself forms the basis for [the capitalist] mode of production. On the other hand, the immanent necessity of this mode of production to produce on an ever-enlarged scale tends to extend the world market continually, so that it is not commerce in this case which revolutionises industry, but industry which constantly revolutionises commerce. Commercial supremacy itself is now linked with the prevalence to a greater or lesser degree of conditions for large industry. Compare, for instance, England and Holland. The history of the decline of Holland as the ruling trading nation is the history of the subordination of merchant’s capital to industrial capital. (Marx, 1894, p.333).

Of particular interest here is Marx’s account of the subordination of commerce to industry with the advancement of manufacturing and its organisation in large-scale industry in particular.

As soon as manufacture gains sufficient strength, and particularly large-scale industry, it creates in its turn a market for itself, by capturing it through its commodities. At this point commerce becomes the servant of industrial production, for which continued expansion of the market becomes a vital necessity. Ever more expanded mass production floods the existing market and thereby works continually for a still greater expansion of this market, for breaking out of its limits. What restricts this mass production is not commerce (in so far as it expresses the existing

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<sup>4</sup> See, for instance, Lenin (1899).

demand), but the magnitude of employed capital and the development of the productivity of labour. (ibid, p.336).

Modern industry is also unique in human history, according to Marx, in its cyclicity and in the association between this cyclicity and the formation and reformation of an industrial reserve army. (Marx, 1867b, pp.785-6). Marx explicitly contrasts his approach in this regard to that of 'Political Economy' (that is, the dominant bourgeois economics of his time), which regards the expansion and contraction of credit as the cause of business cycles in modern industry, whereas these changes in credit are actually in his view a symptom of the industrial cycle. This reserve army is both a product of industrialisation and mechanisation, and a necessary condition of (capitalist) modern industry.

Big industry, with 'its first premise [being] the automatic system' (Marx, 1845, p.57), is also recognised as central in transforming class relations. It consolidated the capitalist class and introduced relative homogeneity in class relations across countries, so developing for the first time an international capitalist class. Marx discusses the effects of the development of big industry on class formation internationally in *The German Ideology*:

[The development of big industry] produced a mass of productive forces, for which private [property] became just as much a fetter as the guild had been for manufacture and the small, rural workshop for the developing craft...Generally speaking, big industry created everywhere the same relations between the classes of society, and thus destroyed the peculiar individuality of the various nationalities. And finally, while the bourgeoisie of each nation still retained separate national interests, big industry created a class, which in all nations has the same interest and with which nationality is already dead; a class which is really rid of all the old world and at the same time stands pitted against it. (ibid, p.57).

The development of big industry transforms the nature of work for the proletarian, with increased division of labour and mechanisation both intensifying alienation. In *The Communist Manifesto*, Marx and Engels describe how 'owing to the extensive use of machinery and to division of labour, the work of the proletarians has lost all individual character, and, consequently, all charm for the workman. He becomes an appendage of the machine...' (Marx and Engels, 1848, p.227). The rate of exploitation also increases with the advancement of big industry. Even 'the workers excluded from big industry are placed by it in a still worse situation than the workers in big industry itself' (Marx, 1845, p.58). Marx and Engels describe these changes dramatically in *The Communist Manifesto*:

Owing to the extensive use of machinery and to division of labour, the work of the proletarians has lost all individual character, and, consequently, all charm for the workman. He becomes an appendage of the machine, and it is only the most simple, most monotonous, and most easily acquired knack, that is required of him. Hence, the cost of production of a workman is restricted, almost entirely, to the means of subsistence that he requires for his maintenance, and for the propagation of his race. But the price of a commodity, and therefore also of labour, is equal to its cost of production. In proportion, therefore, as the repulsiveness of the work increases, the wage decreases. Nay more, in proportion as the use of machinery and division of labour increases, in the same proportion the burden of toil also increases, whether by prolongation of the working hours, by increase of the work exacted in a given time or by increased speed of machinery, etc. (Marx and Engels, 1848, p.227).

The development of big industry consolidates a proletariat and sharpens the contradictions of wage labour. In class struggle, 'the proletarians created by big industry assume leadership of [the class movement of the proletariat] and carry the whole mass along with them' (Marx, 1845, p58).

The historical role of big industry is not only in terms of the development of capitalism, but also in terms of bringing the contradictions of capitalism to the fore. Marx suggests that the development of big industry lays the basis for the abolition of private property, by engendering and intensifying the contradictions between the forces and relations of production:

private property [is] a necessity for certain industrial stages. In *industrie extractive* private property still coincides with labour; in small industry and agriculture up till now property is the necessary consequence of the existing instruments of production; in big industry the contradiction between the instrument of production and private property appears for the first time and is the product of big industry; moreover, big industry must be highly developed to produce this contradiction. And thus only with big industry does the abolition of private property become possible. (ibid, p.81).

The role of modern machine industry in not only facilitating the development of capitalism but in laying the foundations for its ultimate demise is also brought out clearly in these famous words from *The Communist Manifesto*:

The advance of industry, whose involuntary promoter is the bourgeoisie, replaces the isolation of the labourers, due to competition, by the revolutionary combination, due to association. The development of Modern Industry, therefore, cuts from under its feet the very foundation on which the bourgeoisie produces and appropriates products. What the bourgeoisie therefore produces, above all, are its own grave-diggers. (Marx and Engels, 1848, p.233).

### 3.2 The special characteristics of manufacturing for accumulation and growth

The antecedents of many of the ideas about the special features of manufacturing and cumulative causation, developed later in the Kaldorian literature, can arguably be traced to Marx (as well as to some extent to Smith). Kaldor does not cite Marx with reference to these issues, although he does briefly refer to Marx's ideas in other areas (notably the distribution between wages and profits). It is known that some of Marx's ideas concerning manufacturing came to Kaldor through Allyn Young (who taught Kaldor at the London School of Economics in the late 1920s).<sup>5</sup> It would not be surprising if Kaldor himself read Marx's ideas on manufacturing, particularly given the intellectual environment while he was teaching at the University of Cambridge, but there is no explicit indication of this and he does not reference Marx in this regard.

The important 'progressive' features of manufacturing identified by Marx include: division of labour; socialisation of labour; mechanisation; increasing returns to scale; learning-by-doing; and overall, superior potential for cumulative productivity increases. These types of attributes are central to the view in the Kaldorian tradition about the special role of manufacturing in the growth process. This section draws out the insights that can be found in Marx concerning specific qualities of manufacturing. We quote extensively from Marx here because of the partially exegetical element in this discussion.

It is significant that the section of *Capital* devoted to the production of relative surplus-value – Part IV of Volume 1, spanning close to 200 pages – deals with 'sectoral' issues and specifically with manufacturing. In discussing relative surplus-value, this section of *Capital* covers topics such as the division of labour in manufacturing, the value transferred by machinery to the product, and different branches and stages of manufacturing. Before even considering the substance of Marx's arguments, it is apparent from even a perusal of the table of contents of *Capital* that Marx's ideas concerning the production of relative surplus-value are not 'sector-neutral', and moreover that there is something especially relevant about manufacturing. The production of relative surplus-value is in turn central to Marx's approach to accumulation and growth.

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<sup>5</sup> For studies of Kaldor's work, see Thirlwall (1987), Targetti (1992), Harcourt (2001), and King (2009).

Marx builds on Smith's exposition of the progressive role of the division of labour, arguing that this is advanced through manufacturing in particular. Marx conceives of the division of labour at various levels, beginning at the broader level of economic sectors and extending to the micro-level division of tasks in the actual processes of production:

If we keep labour alone in view, we may designate the division of social production into its main *genera* such as agriculture, industry, etc. as division of labour in general, and the splitting-up of these broad divisions into species and sub-species as division of labour in particular. Finally, we may designate the division of labour within the workshop as division of labour in detail. (Marx, 1867b, p.471).

Division of labour is critical for specialisation, which in turn facilitates increasing productivity and hence higher rates of surplus-value. Marx notes that 'manufacture is characterised by the differentiation of the instruments of labour – a differentiation whereby tools of a given sort acquire fixed shapes, adapted to each particular application – and by the specialisation of these instruments, which allows full play to each special tool only in the hands of a specific kind of worker.' (Marx, 1867b, p.460).

What is particularly important in the development of manufacturing is the combination of division of labour and specialisation with the increasing socialisation of labour. Marx discusses the rise in concentration and cooperation in production with the progressions from handicrafts to *manufaktur* to large-scale machine industry. In modern machine industry, the division of labour between workers found in earlier stages of manufacturing becomes division of labour between machines. The synergy between division of labour, specialisation, and socialisation of labour in manufacturing, and the progressive force emanating from this synergy, is expressed well in the following passage:

manufacture, once introduced, develops in [the workers] new powers that are by nature fitted only for limited and special functions. The collective worker now possesses all the qualities necessary for production in an equal degree of excellence, and expends them in the most economical way by exclusively employing all his organs, individualised in particular workers or groups of workers, in performing their special functions. The one-sidedness and even the deficiencies of the specialised individual worker become perfections when he is part of the collective worker. The habit of doing only one thing converts him into an organ which operates with the certainty of a force of nature, while his connection with the whole mechanism compels him to work with the regularity of a machine. (ibid, p.469).

Marx sees co-operation and socialisation of labour as central to increasing returns of scale. Co-operation and socialisation of labour reach new heights in manufacturing, and this

facilitates a high degree of increasing returns. Marx's eloquent exposition of co-operation-induced increasing returns to scale is worth quoting at some length:

Just as the offensive power of a squadron or cavalry of an infantry regiment, is essentially different from the offensive or defensive powers of the individual soldiers taken separately, so the sum total of the mechanical forces exerted by isolated workers differs from the social force that is developed when many hands co-operate in the same undivided operation...Not only do we have here an increase in the productive power of the individual, by means of co-operation, but the creation of a new productive power, which is intrinsically a collective one. Apart from the new power that arises from the fusion of many forces into a single force, mere social contact begets in most industries a rivalry and a stimulation of the 'animal spirits', which heightens the efficiency of each individual worker. This is why a dozen people working together will produce far more, in their collective working day of 144 hours than twelve isolated men each working for 12 hours, and far more than one man who works 12 days in succession. (ibid, pp.443-4).

Note in the above passage Marx's use the term 'animal spirits', an idea usually associated with Keynes rather than with Marx. Even in the German original, Marx refers to 'Erregung der Lebensgeister (animal spirits)'. The German could be translated as 'life spirits', and it is Marx who adds the English term 'animal spirits' to the German text. (Marx, 1867a, p.324). This is not the only place in which Marx uses this term; see, for instance, the extract from page 447 cited below. It was not Marx who coined the term, as it was already in classical usage, but Marx may have been the first to use it in this specific context. The incitement of 'animal spirits' is one of the channels he identifies through which increasing scale of production and co-operation can increase labour productivity.

In the following important passage Marx elaborates on the various mechanisms through which co-operation and socialisation of labour in manufacturing increase productivity and facilitate increasing returns to scale. These channels include the reorganisation of production in a way that raises productivity; what we might term 'joined-up' production; economising the means of production needed for any given level of output; homogenisation of labour; and the invocation of 'animal spirits' in way that increases workers' productivity:

The combined working day produces a greater quantity of use-values than an equal sum of isolated working days, and consequently diminishes the labour-time necessary for the production of a given useful effect. Whether the combined working day, in a given case, acquires this increased productivity because it heightens the mechanical force of labour, or extends its sphere of action over a greater space, or contracts the field of production relatively to the scale of production, or at the crucial moment sets large masses of labour to work, or excites rivalry between individuals and raises their animal spirits, or impresses on the similar operations carried

on by a number of men the stamp of continuity and many-sidedness, or performs different operations simultaneously, or economizes the means of production by use in common, or lends to individual labour the character of average social labour – whichever of these is the cause of the increase, the special productive power of the combined working day is, under all circumstances, the social productive power of labour, or the productive power of social labour. This power arises from co-operation itself. When the worker co-operates in a planned way with others, he strips off the fetters of his individuality, and develops the capabilities of his species. (ibid, p.447).

The concept of 'learning-by-doing' is probably most strongly associated with Arrow, with Young, and with the Kaldorian tradition. Learning-by-doing is regarded in the classical developmentalist and heterodox literature as being especially strong in manufacturing (relative to other sectors), and this is one of the characteristics of manufacturing that accords it a special role in the economic growth process. The conception of learning-by-doing and its particular importance in manufacturing was developed at an early stage by Marx. In the passage below he discusses learning-by-doing (without using that phrase) in manufacturing and the importance of this for increasing productivity in manufacturing:

[In manufacture], in comparison with the independent handicraft, more is produced in less time, or in other words the productivity of labour is increased. Moreover, once this partial labour is established as the exclusive function of one person, the methods it employs become perfected. The worker's continued repetition of the same narrowly defined act and the concentration of his attention on it teach him by experience how to attain the desired effect with the minimum of exertion. But since there are always several generations of workers living at one time, and working together at the manufacture of a given article, the technical skill, the tricks of the trade thus acquired, become established, and are accumulated and handed down. Manufacture, in fact, produces the skill of the specialized worker by reproducing and systematically driving to an extreme within the workshop the naturally developed differentiation which it found ready to hand in society. (ibid, pp.458-9).

Marx's argument here is important in establishing the importance of learning-by-doing not only at the level of an individual worker, whose productivity is increased by repeated performance of the same task in a manufacturing process, but also at the level of the labour force as a whole. This is a critical aspect of learning-by-doing in terms of manufacturing as an engine of growth: the accumulation and dissemination across the workforce of productivity-enhancing skills. It is also important to dynamic economies of scale, not just at the factory or enterprise level but at the sectoral level as well.

Marx's conception of learning-by-doing is closely tied in with the division of labour as well as with the socialisation of labour in manufacturing. The division of labour allows for the development of skills through specialisation of workers in particular tasks. The socialisation of labour allows for these skills to be built up over time not just for an individual worker but for the manufacturing workforce more generally, through the passing on of skills which have been built up through experience.

These insights into learning-by-doing in manufacturing, and specifically into the accumulation and reproduction of these skills, might also suggest the endogeneity of productivity growth in manufacturing to the rate of output growth in manufacturing (which is formalised as Kaldor's Second Law, also known as Verdoorn's Law). In Volume 3 of *Capital* Marx also emphasises the relationship between the scale of production and learning-by-doing and associated innovations in the productive process. He discusses the productivity improvements that are enabled by the concentration of the means of production and the 'social nature of labour' facilitated by the 'accumulation and co-operation of labourers'. Marx argues in this respect that 'the continual improvements, which are here possible and necessary, are due solely to the social experience and observation ensured and made possible by the production of aggregate labour on a large scale.' (Marx, 1894, p.79). This brings out the social nature of learning-by-doing and the endogeneity of this to the scale of production, thus pointing to increasing returns to scale and to the endogeneity of productivity to scale.

Marx also discusses how learning-by-doing combined with division of labour leads to the standardisation of labour and production processes, which are important in the development of manufacturing:

The labour-time necessary to attain the desired effect in each partial process [of manufacturing] is learnt by experience, and the mechanism of manufacture, taken as a whole, is based on the assumption that a given result will be obtained in a given time. It is only on this assumption that the various supplementary processes can proceed uninterruptedly, simultaneously, and side by side. It is clear that the direct mutual interdependence of the different pieces of work, and therefore of the workers, compels each one of them to spend on his work no more than the necessary time. This creates a continuity, a uniformity, an order, and even an intensity of labour, quite different from that found in an independent handicraft or even in simple co-operation. (Marx, 1867b, pp.464-5).



Whereas in other sectors this standardisation is in general enforced externally by competitive pressures, in manufacturing it is the internal technical conditions of production that are critical in the reduction and standardisation of labour time to the socially necessary labour time of any given commodity:

The rule that the labour-time expended on a commodity should not exceed the amount socially necessary to produce it is one that appears, in the production of commodities in general, to be enforced from outside by the action of competition: to put it superficially, each single producer is obliged to sell his commodity at its market price. In manufacture, on the contrary, the provision of a given quantity of the product in a given period of labour is a technical law of the process of production itself. (ibid, pp.464-5).

Mechanisation is naturally linked to the manufacturing sector, and Marx conceives of increasing mechanisation as being integrally tied in with the development of capitalism. Not only is manufacturing necessary for mechanisation in any sector of the economy,<sup>6</sup> but Marx also argues that mechanisation finds expression in manufacturing more than in any other type of activity. Science and technological advances are increasingly important in the progression from handicrafts to *manufaktur* to modern machine industry. He identifies technological progress in manufacturing as important in allowing for the overcoming of human limitations in increasing productivity.

Mechanisation is pushed forward in capitalism by the drive to continually expand the production and appropriation of surplus-value. Mechanisation is dialectically related to both the division of labour and to the development of capitalism. Mechanisation and capitalist development each feed into the other, as do mechanisation and the division of labour. Although Marx does not use the terminology of cumulative causation, the logic of this is clearly evident in his dialectical treatment of the relationships between mechanisation, division of labour, accumulation, and capitalist development.

The importance of mechanisation implies something for manufacturing, since it is in the manufacturing sector that machines are produced (although not necessarily the domestic manufacturing sector). Technological progress is embodied in new capital goods, and the fact that these goods are produced in the manufacturing sector gives manufacturing a particular role in overall technological advancement. While machinery can be imported, this

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<sup>6</sup> Although manufactured inputs can, of course, be imported.

would need to be paid for with exports of other goods. Furthermore, the importing of machinery means that a country foregoes some of the benefits associated with the diffusion and development of technology. There is thus a close relationship between the increased mechanisation of the economy as a whole – which Marx relates closely to increasing division of labour, specialisation, returns to scale, and so on – and the development of the manufacturing sector specifically. Similarly for technological progress: the development of manufacturing is crucial for technological progress in other sectors, given that new technological innovations (other than those relating purely to the organisation of production) need to be embodied in manufactured instruments or machines and hence arise directly or indirectly from manufacturing.

Labour productivity is central to Marx's ideas on technological progress and accumulation. Whereas a lengthening of the working day increases absolute surplus-value, increasing labour productivity increases relative surplus-value. Marx argues in *Capital* that both relative and absolute surplus-value increase with the development from handicrafts to *manufaktur* and even more so with the progression to modern machine industry. Manufacturing is characterised not only by generally higher labour productivity relative to other sectors of the economy, but also by relatively unlimited potential for ongoing productivity increases, and this is of central importance for accumulation and growth. For instance, Marx notes that even 'early in the period of manufacture, the principle of lessening the labour-time necessary for the production of commodities was consciously formulated and expressed' (ibid, p.467).

Marx clearly links the division of labour in manufacturing and the increases in labour productivity to increases in the rate of surplus-value. For instance, having discussed how increasing division of labour and specialisation either obviates the need for apprenticeship in the case of unskilled workers or diminishes the costs in the case of skilled workers, Marx states clearly that:

the relative devaluation of labour-power caused by the disappearance or reduction of the expenses of apprenticeship directly implies a higher degree of valorisation of capital; for everything that shortens the necessary labour-time required for the reproduction of labour-power, extends the domain of surplus labour. (ibid, p.470).

Marx draws attention to the particular importance of manufacturing in the relationship between the increasing productivity of labour (and hence of increasing the rate of relative surplus-value) and the development of the means of production. In this context we can also note the dialectic between increasing labour productivity and the development of the means of production, which he sees as each being both a cause and consequence of the other:

The consequence of the division of labour (under manufacture) and the application of machinery is that more raw material is worked up in the same time, and, therefore a greater mass of raw material and auxiliary substances enters into the labour process. That is the consequence of the increasing productivity of labour. On the other hand, the mass of machinery, beasts of burden, mineral manures, drain pipes, etc., is a condition of the increasing productivity of labour...But whether condition or consequence, the growing extent of the means of production, as compared with the labour-power incorporated with them, is an expression of the growing productivity of labour. (ibid, p.773).

In *Grundrisse* Marx identifies the extraordinary productivity of labour and scope for productivity increases in big industry, and of the particular importance of technological advances in this regard:

to the extent that large industry develops, the creation of real wealth comes to depend less on labour time and on the amount of labour employed than on the power of agencies set in motion during labour time, whose "powerful effectiveness" is itself in turn out of all proportion to the direct labour time spent on their production, but depends rather on the general state of science and on the progress of technology, or the application of this science to production. (The development of this science, especially natural science, and all others with the latter, is itself in turn related to the development of material production.) ... Real wealth manifests itself, rather – and large industry reveals this – in the monstrous disproportion between the labour time applied, and its product, as well as in the qualitative imbalance between labour, reduced to a pure abstraction, and the power of the production process it superintends. (Marx, 1857, pp.704-5).

The above passage elucidates the relatively unlimited potential for productivity increases in big industry and the implications of this for accumulation. The development of big industry and the technological progress therein completely transforms the relationship between 'inputs' and 'output', such that wealth creation can accelerate without commensurate increases in labour. This renders big industry especially important in the accumulation process and in the development of the productive forces.

The dialectical nature of Marx's exposition arguably contains an implicit notion of cumulative causation. An idea of cumulative causation is eloquently brought out in the following passage from *Wage-labour and Capital*:

we thus see how the method of production and the means of production are constantly enlarged, revolutionised, how *division of labour necessarily draws after it greater division of labour, the employment of machinery greater employment of machinery, work upon a larger scale work upon a still greater scale.* (Marx, 1849, p.43; emphasis in original).

Furthermore, division of labour, the development of capitalism, technical progress, and rising productivity of labour feed off and into themselves and each other. This conceptualisation implies potential for hysteresis, where an economy that is on a path of mechanisation, technical progress, growth in manufacturing, and high rates of accumulation and economic growth, is inclined to continue along such a path, or conversely an economy might be stuck in underdevelopment.<sup>7</sup> The development of manufacturing is integral to this.

The features of manufacturing discussed above tend to support higher rates of surplus-value. Furthermore, the scale at which manufacturing is typically organised and the concentration of ownership mean that the mass of surplus-value at the disposal of a capitalist will be relatively high. This is crucial for accumulation.

A final issue relevant characteristic of manufacturing to be noted here is in relation to is the balance of payments. This issue is one of the reasons why manufacturing is regarded as having an important role in growth (relative to services), particularly in the Kaldorian and structuralist traditions. Interestingly, this is also something that Marx picks up upon in *Theories of Surplus Value*. He observes that services are less tradable than manufactures, and that even when services are 'exported' in the form of the service-provider, the benefits to the exporting country are less than in the case of the export of manufactured commodities:

It is true that the country cannot export these services [entertainment, legal services etc.] as such; but it can export those who perform the services. Thus France exports dancing masters, cooks, etc., and Germany schoolmasters. With the export of the dancing master, or the

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<sup>7</sup> This has implications for the challenges which developing countries face in 'catching up' with larger and more advanced economies. Failure to upgrade technologically is likely to make it increasingly difficult to catch up, given the dynamics of cumulative causation, particularly when there are increasing returns to scale.

schoolmaster, however, his revenue is also exported, while the export of dancing shoes and books brings a return to the country. (Marx, 1861, p.162).

Note that this difference derives from the very features of service commodities that distinguish them from manufacturing, namely, the inseparability of the production and consumption of services in time and in these cases also in space.

Insofar as Marx considers capitalism to be a progressive historical force, the progressive characteristics of capitalism thus tend to be particularly strongly associated with manufacturing. These progressive characteristics are in part related to the potential of manufacturing (relative to other sectors) to generate surplus-value, facilitate accumulation, and support economic growth; and in part to the implications for the structure and ideological orientation of the working class. Having said this, however, it should be borne in mind that these views are probably in part related to the historical context in which Marx was writing, which predated the development of heavy mining, niches of relatively standardised services or hi-tech services, and so forth.

It is characteristics of manufacturing such as the replicability of manufacturing commodities and production processes, the fact that it is viable to separate production and consumption in time and space, advanced division of labour and specialisation, socialisation of labour, and high levels of mechanisation and relatively unlimited scope for further mechanisation, that facilitate properties such as learning-by-doing and increasing returns to scale. The key issue around the specificity of manufacturing is that there tends, at a general sectoral level, to be greater scope for cumulative productivity increases than in other sectors.

### **3.3 ACTIVITY-SPECIFICITY**

The special properties and increasing 'progressivity' which Marx identifies in the progression from simple co-operation to *manufaktur* to large-scale machine industry are, on the one hand, to some extent specific to manufacturing as a sector relative to other sectors. This progressivity is also, on the other hand, to some extent a function of features such as increasing scale of production, increasingly advanced technology, and increasingly sophisticated organisation of production that come with each of these 'stages'.

We thus draw out two dimensions of the activity-specificity of growth from a Marxian perspective, and refer to these as the sectoral and ‘technological-organisational’ dimensions. The technological-organisational dimension refers to the way in which an activity is organised and carried out, in terms of characteristics such as scale, division of labour, the extent and nature of deployment of machinery and technology, and so on.

If comparing, for instance, the manufacture of hand-made furniture in a small workshop with a large-scale agricultural plantation, the relative progressivity of these two activities (in the sense of potential for sustained and cumulative productivity increases) cannot be conclusively determined *a priori*. In terms of the sectoral dimension, the first of these activities is in manufacturing and the second in agriculture. Yet in terms of the technological-organisational dimension, the second activity is likely to have greater scope for division of labour, technological advances, economies of scale, and labour-saving productivity gains.

While there are certainly some non-manufacturing activities which have a higher degree of technological-organisational progressivity than some manufacturing activities, the characteristic features of manufacturing that distinguish it from other sectors of the economy tend to be relatively conducive to greater technological-organisational advancement. Our interpretation of Marx’s analysis suggests that these two aspects of activity-specificity – sectoral and technological-organisational dimensions – are not independent. Despite significant variance within non-manufacturing surplus-value-producing activities in terms of scope for cumulative productivity increases, certain of the intrinsic features that typologically distinguish them from manufacturing ultimately constrain their potential in this regard.

It is surely not coincidental that Marx discusses the handicrafts – *manufaktur* – large-scale machine industry progression specifically in terms of the manufacturing sector. There is no equivalent progression set out with respect to non-manufacturing activities. Indeed, as noted earlier, this entire discussion of manufacturing in *Capital* is located in the section on the production of relative surplus-value.

#### 4. CONCLUSION

Sectors are not the units of analysis in Marxian economics. What is most fundamental to a Marxian classification of economic activities is the relationship of an activity to the production, realization, and appropriation of surplus-value. This relationship can be understood in terms of an activity's location in the circuit of capital, and specifically as to whether or not surplus-value is directly produced in the activity. While Marxian economics is not based on sectors, this does not mean that sectors are irrelevant to a Marxian approach. There is some relationship between sectors and the characteristics of activities that are important in Marxian terms, especially in terms of growth implications.

We drew out from Marx's writings an analysis of the specificity of manufacturing. According to this interpretation, the precursors of a number of the ideas about the specialness of manufacturing, that are associated with the Kaldorian tradition, can actually be found in Marx. These include increasing returns to scale, learning-by-doing, technological advancement, division and socialisation of labour, the endogeneity of productivity to scale, and even the importance of manufacturing to balance of payments. It is interesting that Marx developed these ideas, relating them specifically to manufacturing, at any early stage.

Furthermore, it is significant that the part of *Capital* on relative surplus-value actually deals with manufacturing and the scope for productivity improvements in manufacturing. This in itself points to something specific and interesting about manufacturing. Furthermore, a concept of cumulative causation is implicit in Marx's conceptualisation of dialectical relationships between mechanisation, competition, division of labour, accumulation, and capitalist development, as he describes how these feed into themselves and each other. Marx's view of the economically and socially transformative role of industrialisation is to some extent historically specific, but it also derives from the particular characteristics of manufacturing relative to other sectors.

To the extent that we can read Marx as regarding there as being something 'special' about manufacturing, this is not quite the same as in the sector-based Kaldorian and structuralist approaches. While the progressive qualities of manufacturing that Marx discusses are to some extent relative to other sectors of the economy, these qualities are to some extent

also associated with the development of manufacturing from handicrafts to *manufaktur* to modern machine industry. What is 'special' is not purely a sectoral issue, but is also related to the way production is organised and carried out, scale, the technological content of production and so on. These aspects are referred to here as the technological-organisational dimension of activity-specificity, and can apply (to a certain extent) to other sectors as well.

We have thus argued that there are two relevant dimensions of activity-specificity for growth: sectoral and technological-organisational dimensions, and moreover that there is some relationship between these two. The very characteristics of a (surplus-value-producing) activity that define it as being in one or other sector of the economy have implications for the degree of technological-organisational advancement. This implies that, from a Marxian perspective, change in the sectoral composition of an economy is unlikely to be growth-neutral.



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