

The PST system of classifying occupations

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Information about the occupational structure of a community throws an important light on many aspects of its functioning. Even in a relatively simple economy, however, the number of different occupations is often considerable, and in a large and complex economy the total of different occupations may run into many thousands. It is, therefore, essential, if the occupational material is to be made amenable to description and analysis, to group the individual occupations according to some organisational principle. Only after this has been done is it possible to make an intelligible comparison between different economies at the same point in time, or to study the changing nature of a single economy over time. In deciding between different systems of classification the underlying purpose of any given piece of research must be the criterion used in making a choice. No one system is definitively 'better' than all others. Which one is best for a given exercise will depend upon the nature of the research being undertaken.

Problems in the interpretation of occupational information

Before setting out the rationale of the PST (primary, secondary, tertiary) system, it may be helpful to consider several considerations which affect the interpretation of the results when using any system of occupational classification. The first concerns the use of time for productive purposes. It is tempting to suppose that if, say, 3 per cent of all males in an occupational census are recorded as carpenters, then approximately 3 per cent of the time spent by men on productive activity is spent in carrying out carpentry work; or to put the same point differently, that the patterns of activity revealed by an occupational census should broadly mirror those revealed by time budget studies, such as those carried out in the early nineteenth century by Frédéric LePlay.¹ Even today the patterns are unlikely to be identical. Much carpentry, for example, is carried out in their 'leisure' time by men who are not carpenters by trade. And, equally, many carpenters may, in addition to work done in formal employment, spend part of their leisure hours in home decorating or in cultivating an allotment. There are a host of such activities which add to overall productive output but are

¹ . Le Play, *Les ouvriers Européens*.

missed if the only sources of information are occupational data. Since more men and women are able to paint and decorate than are competent electricians or plumbers, time budget studies may reveal a somewhat different balance of productive activity from that suggested by occupational data. In the past the mismatch between an occupational designation and the pattern of time spent in productive activity could be substantial. When a farmer sold any surplus grain locally he might well use his own horse and cart to take it to market or to a local purchaser, but when distant markets, such as London, became dominant, the grain would be much more likely to be transported by a carter. The change would alter the occupational structure, showing a shift from primary into tertiary employment, but the change in time allocation would be much less than suggested by the change in occupational structure.

A similar point arises when the proportion of married women in gainful employment outside the home increases. The occupational structure may change substantially, but once more the change in time spent on various productive activities may change much less. To take a trivial example, half a century ago peas were sold in the pod and they were shelled in the kitchen. Nowadays the same operation is carried out in a factory and those employed by the factory will appear as engaged in a branch of manufacture, thus modifying slightly the occupational structure but if the source of information was a time budget study the change would be in the location of the activity rather than in the activity itself.

It is generally assumed that as an economy becomes more developed and sophisticated, as the market increasingly supplies goods and services which were once produced domestically without involving the cash nexus, the share of unpaid productive labour will shrink. As a summary statement of trend, this is probably a fair assumption to make, but although on balance unpaid productive work may represent a declining fraction of all productive activity, it is well to be aware that the trend is not uniform. For example, the competitive success of supermarkets is in part attributable to the fact that much of the labour involved in bringing about the retail purchases made at the supermarket is provided unpaid by the customer. In a grocer's shop in the past, the work of assembling the items which the customer wished to buy was carried out by the man or woman behind the counter who was employed for that purpose. In a supermarket the buyer carries out this work unpaid. Similarly, the grocer's delivery van would deliver the week's purchases to a customer in the past, but now the customer provides the transport between supermarket and home. The van driver was paid for his work, the customer operates outside the formal market. The gradual

disappearance of the milkman from suburban streets reflects the same change. The transport needed to move milk bottles or cartons from the distribution centre to the home is now provided by the purchaser rather than being supplied by a man paid to perform the service. The shorter the working day and week, the larger the proportion of waking hours which may be devoted to productive activities not performed within the formal economy

Another issue which is often raised in discussions of occupational information concerns dual or multiple occupations. They were commoner in the past than in the present. Sometimes the fact is explicit in that a man may be recorded as 'butcher and grazier' rather than simply as 'butcher', but even when this is not the case it may be prudent to assume that a man spent only part of his time engaged in the type of work indicated by the occupational term used to describe him.² Many a parson was also a part-time farmer. Sometimes pointing to this problem is suggested as a reason to question the value of collecting and analysing occupational data for past centuries even though they may be agreed to be a tolerably reliable as a guide to conditions in the present. But this is an excessive reaction to the difficulty of making good use of such data. Two considerations should be borne in mind in this connection.

The first consideration tends to limit the scale of any distortion. While it is true that some weavers were also smallholders and devoted a substantial part of their time to agriculture, it is also true that there were some small farmers who were also weavers. In other words, the degree to which reliance on occupational descriptors introduces distortion between the apparent and the 'true' situation will be less than might appear at first sight. Especially when thinking in 'time budget' terms this offsetting factor will tend to reduce any distortions associated with the 'dual occupations' problem. The second consideration harks back to a point already mentioned and applies equally to descriptors indicating dual occupations and those which appear to indicate a single occupation. Even if dual occupations had been as rare in the past as today, occupational data would be an uncertain guide to the proportion of time spent on the whole range of productive activities for a reason which applies also today. If the importance of interior decoration within the national economy were to be judged by the number of men and women employed as painters and decorators, it would

². The term 'butcher and grazier' used in reference to the early modern period might be regarded as describing a single rather than a dual occupation since so many butchers themselves kept cattle but they are distinct forms of economic activity and it would be incautious to assume that *all* butchers were also graziers, and still less that all graziers were also butchers.

be seriously underestimated because so much of this work is done by men and women unpaid and in their own time. And a similar story could be told of many other productive activities, cooking and food preparation, cleaning, minor house repairs, etc. In each case there are substantial numbers formally employed in such work from restaurant staff to small builders but their number would be a deceptive guide to the importance of such productive activities in the economy as a whole. These considerations have a bearing on the interpretation of occupational data both in the past and in the present. In other words, making effective use of information about occupational structure is certain to require an appropriate framework of interpretation if reliable conclusions are to be drawn from the data, and this issue is relevant when making use of contemporary material as well as in marshalling historical evidence.

There are, of course, problems with historical data which are absent or much less serious when making use, say, of a recent occupational census. Some of the problems with historical data are self evident. For example, in many of the most important historical sources the occupational information is incidental to the main concerns of those who were collecting the information. Eighteenth-century militia lists, for example, often specify the occupation of each man on the list, but the purpose of exercise was not the collection of occupational data. The same is true court records, tax lists, and parish registers, all of which provide very informative evidence about occupation in the past, but their successful use must hinge on knowing their likely biases and omissions. For example, the provisions of Rose's Act³ ensured that when a child's baptism was recorded in an Anglican parish register after 1 January 1813, the occupation of the father formed part of the entry, but it also meant that the substantial fraction of the population which was nonconformist did not figure in the record. Furthermore, parish baptism registers only throw light on the occupations of married men. In contrast, in a modern census the question or questions about occupation must be answered by everyone filling in the census form (at least in principle).

Other problems in using historical sources are less immediately obvious but often of great importance. Words describing occupations came and went: some which were once rare or non-existent might become commonplace; others which once had wide currency might gradually disappear from normal usage. It is especially striking that this happened in the most important of all industries in early modern England, agriculture. It is indicative of the scale of the changes taking place in agriculture that by the end of the eighteenth century both

³ . 52 George III c. 146.

husbandman and yeoman, the dominant descriptors two centuries earlier, had given way to farmer and labourer as the most widespread terms used to describe those engaged in farming. This in turn means that whereas an attempt can be made to trace overall employment in agriculture over the two centuries in question, it is more problematic to follow changes in the composition of such employment.

The meaning of occupational descriptors changed over space as well as over time. A navigator in the seventeenth century was employed at sea. With canal construction a century later the term became used in connection with the construction and maintenance of canals and later (as 'navvy') even at times for labour in construction work more generally. A banker in eighteenth-century London was engaged in much the same range of financial activities as a banker in London today. In other parts of the country it had a different meaning. A banker in north Cambridgeshire at the same date was employed in the repair and maintenance of dykes and canal banks.

Census data and sources relating to individuals

Before describing and illustrating the PST system for classifying occupations, some preliminary points should be noted first. Most studies of occupation draw their data from published censuses. This means that the information has already been processed. It has been consolidated into groupings which were devised by those who directed the census. This is a very different situation from that in which the information relates to individuals. Where this is the case the options open to the investigator are much wider than where the source is a published census. For example, those making use of nineteenth-century English censuses are constrained by the solution adopted by the census authorities to a tricky problem. Many men and women were both makers and sellers of a given product. The census often used a single category for the two functions (as, for example, 'bonnet maker/dealer'). It is impossible to tell from the census itself how often the original statement made by an individual on census night named a joint occupation as opposed to stating simply that he or she was solely a bonnet maker or solely a dealer in bonnets. Where the information is taken directly from the enumerators' books this uncertainty is absent or at least much reduced. Thus opportunities which exist with individual-level data may be lost in published census material.

Sources which relate to individuals rather than groups, however, are not free from problems. It may be important to consider, for example, whether the information was provided by the individual himself or was a statement about him made by another. Where the information is drawn from census enumerators' books it is likely that the occupation of the head of the household will represent his own view of his occupation, though the problem may be present in the designation of the occupations of others in the household, since they may represent the view of the head rather than that of the person concerned (and may exist even in the case of the household head since the information in the enumerators' books is a transcription by the enumerator of the information on the household schedule and it is very probable that this sometimes involved changing what had been entered on the schedule⁴). The problem is more prominent when using a source such as parish registers. Entries in a parish register are made by the parish clerk or the incumbent. In the case of a burial register it is evident that if the occupation of the deceased is recorded it must reflect the judgement of another person, but the case is unclear with marriage and baptism registers. Sometimes the incumbent may have made inquiry and recorded the answer given by the groom at a wedding or by the father of a child at a baptism; more commonly in all probability the incumbent relied on his own judgement. The parish of Blackawton in Devon provides an example of the occasional waywardness of those recording information about occupation in the parish register. It was a parish in which in the early nineteenth century agriculture was the dominant employer. In the early years of the century those working on the land were described either as farmers or labourers. In 1814, however, the term 'labourer' disappeared from the baptism register to be replaced by 'husbandman'. Five years later there was a reversal to the earlier pattern. The change in descriptor did not imply that the situation on the ground changed. The same men continued to perform the same work throughout, but a change of incumbent or perhaps of parish clerk meant a change in nomenclature. In this case it is easy to avoid any misunderstanding but in other cases it may be difficult or impossible to distinguish between real and spurious change.

A further point to be borne in mind is that information apparently relating to individuals may sometimes be better regarded as relating to a family or household. Where a man was described as a blacksmith it is probable that he alone was engaged in smithying, but where he was described as a stocking hosier or an innkeeper, or a grocer and fruiterer it is

⁴. See Tillott, 'Sources of inaccuracy'.

likely that his wife and in some cases other members of his family were also involved and that the production unit was the family rather than an individual.

The PST system and the study of the industrial revolution

The preceding sections of this article provide background to the description of the rationale of the PST system of classifying occupations. As already noted, the choice of system depends upon the object in view. One of my main research interests for many years has been the transformation of the economy of England by what is conventionally termed the industrial revolution. The industrial revolution changed the economic prospects of mankind fundamentally. It brought into being the capacity to produce on a scale which for the first time in human history made it possible to free the bulk of the population from the reality or the fear of grinding poverty. As a description of the changes taking place, however, the term industrial revolution is far from ideal. Both the adjective and the noun are likely to be misleading if taken at face value but the term has been used so long and so widely that to attempt a fresh start would be quixotic.

It may be helpful to specify briefly what I have in mind in referring to the industrial revolution. All pre-industrial economies were organic economies in the sense that almost all material production was pyramided upon the productivity of the land. The land was the source not just of food but of all the raw materials used by industry. This was effectively true not simply of industries using vegetable and animal raw materials such as wood, flax, wool, cotton, or leather but also of industries producing metal products since the ability to smelt tin, copper, or iron depended upon the generation of heat from burning wood and charcoal. Since the area of farmland and woodland could not be expanded indefinitely as the demand for food, fodder, wood, and industrial raw materials grew, pressure on the land inevitably intensified when economic growth occurred. In these circumstances the marginal return to both labour and capital was bound eventually to decline in the manner set out so forcefully by Ricardo.⁵

The problem can also be expressed in different terms which bring home the nature of the barrier to economic growth even more starkly. Since the vegetable growth was the

⁵. Ricardo, *Principles*, pp. 125-6. The other great classical economists agreed with him.

ultimate base of all material production in an organic economy, the final constraint on production was the process of photo-synthesis in plants. Men and women, in common with all living creatures, depended on this process for their continued existence. The growth of grass on the African savannah not only governed the number of zebras and antelopes which could be sustained but also the number of lions and cheetahs. And the same could be said of men. The parallel is obvious in hunter/gatherer communities. The neolithic food revolution transformed human access to the products of photosynthesis because vast tracts of land were no longer covered by 'natural' vegetation but only by plants which men could eat, convert into clothing, or feed to their flocks. The bar was raised much higher by this change but the bar remained and when numbers had risen to match the new resource level the same constraints operated.

The process of plant photo-synthesis, however, captures only a very small fraction of the energy present in incident sunlight. The quantum of energy secured by plant photo-synthesis represents the upper limit of energy available to organic economies. Energy is essential both to maintain life and to carry out any productive process. Industry and transport necessarily involve the expenditure of heat or mechanical energy and it is not difficult to demonstrate that this restricted both the scale of output and the level of individual productivity.⁶ In referring to the 'laborious poverty' which, he noted, had been the fate of all societies until the industrial revolution, W.S. Jevons was not exaggerating.⁷ In this context the key change brought about during the industrial revolution was the unlocking of a new energy source in the form of a fossil fuel. Coal represented the accumulated products of photo-synthesis built up over a geological age. Previously the annual cycle of plant growth set the production horizon of all societies. With the advent of fossil fuels this barrier disappeared.

In organic economies the realities of energy poverty meant that the bulk of all employment was on the land. Cultivating the soil and growing and harvesting crops involves a large expenditure of mechanical energy which in the circumstances of an organic economy meant the muscle energy of men and animals. Labour productivity was low. Typically, at best three families might between them produce sufficient to feed themselves and perhaps one other family. Three quarters of the labour force worked on the land. It was necessary for

⁶ . Wrigley, *Energy and the English industrial revolution*, ch. 1.

⁷ . Jevons, *The coal question*, p. 2.

agriculture to employ the bulk of the labour force if the population was to be fed and basic industrial raw materials were to be produced. The essence of the industrial revolution when approached from this angle lay in transforming the output of energy and in so doing removing the old constraints on individual productivity and prevailing living standards. Keeping track of the changing proportion of the labour force engaged in primary, secondary, and tertiary activities throws light on the scale and timing of the changes taking place.

Primary, secondary, and tertiary activities may be briefly defined as follows (the next section provides greater detail and illustrations). All material production begins with the securing of raw materials. Primary production refers to this process. Primary occupations are those in which raw materials are produced. The secondary sector comprises those industries in which the raw materials are converted into finished products. Men and women employed in these industries are engaged in secondary production. The tertiary sector is more miscellaneous, including all other occupations. A major element in the tertiary sector consists of activities which are 'downstream' from the output of primary and secondary industry --- the transport of raw and finished products to their places of manufacture or consumption, and the employment in wholesale and retail activities which make the products available to consumers. Transport was also essential, of course, at every stage of material production, facilitating both primary and secondary activity; and the same was true of employment in a range of financial, legal, and other services. There were also, however, there are many tertiary occupations which are much less closely related to the primary and secondary production; for example, personal services; communication other than transport, such as postal services; hotels and pubs; government administration; the armed forces; and the professions, teaching, medicine, religion, and the law.

The relative size of primary, secondary, and tertiary employment changed radically in the course of the industrial revolution and its aftermath. The composition of the labour force changed because of the differing income elasticity of demand for primary, secondary, and tertiary products. The income elasticity of demand for the three categories of product differs, being lowest for primary and highest for tertiary products. As the average level of real incomes rise, therefore, the proportion of aggregate demand devoted to the products of primary industry falls, while that for the products of secondary and tertiary industry rises, but in aggregate more rapidly for tertiary than for secondary products. The proportion of the average family's income spent on food declines if its income rises, balanced by a rise in the

proportions spent on manufactured products and services of all kinds. As a result, labour force composition adjusts to reflect changes in the proportion of aggregate income spent on the products of primary, secondary, and tertiary industry. It is for this reason that the relative size of the primary, secondary, and tertiary elements in the labour force in a very poor country may be perhaps 80:15:5, and will be gradually reversed as incomes rise to the level enjoyed in advanced countries today, where the PST division is turned on its head and may run 5:15:80.

The nature of the forces driving this change is illustrated by the following imaginary, and artificially simple, individual case. Suppose that a family in a poor country has 100 units of income of which 75 units is spent on food, and the rest on simple manufactures and services. By good fortune, their income increases to 150 units. Their spending on food rises from 75 to 100 units but their spending on secondary and tertiary products rises from 25 to 50 units. Their income overall rises by 50 per cent, but their spending on food rises only by a third while their spending on other goods and services doubles. In parallel with this change the occupational distribution of the labour will also change, and it is a relatively straightforward matter to follow this change using the PST system, provided, of course, that suitable sources exist to provide the necessary empirical data.

It was the object of recent work at the Cambridge Group to provide a firm basis for tracking this change. The patterns revealed by this exercise suggest that some models of the timing and nature of the industrial revolution will need to be reconsidered. It is, for example, clear that the changes were cumulative and progressive rather than abrupt. In Tudor times perhaps c. 70 per cent of the workforce was engaged in agriculture but by 1800 this was true of less than 40 per cent of the workforce, a far smaller percentage than in other European countries apart from the Netherlands. The decline was already well in train by the beginning of the eighteenth century. Given the fact that the national population more than doubled between the reign of Elizabeth and the Napoleonic war period, this implies that the rise in the absolute numbers employed in secondary and tertiary employments must have quadrupled, with the bulk of the increase occurring in the eighteenth century. Another point of interest is that, despite its title, during the later decades of the 'classic' period of the industrial revolution the rate of increase in tertiary employment exceeded that in secondary employment. And there is much to be learned from the geographical distribution of the population growth which mirrored the differential growth in employment opportunities in

different industries and service occupations. The populations of the agricultural counties of England rose only modestly between 1650 and 1800. In many cases the rise was less marked than in comparable areas on the continent. But in counties such as Lancashire, the West Riding of Yorkshire, and Staffordshire where industry flourished, growth was very rapid, even hectic.⁸

The assertion that the income elasticity of demand for secondary products was higher than for the products of primary industry, while rising still higher for those of tertiary industries holds true as a generalisation. Otherwise there would not have been the radical changes in the proportionate share of employment in each of these three categories which has taken place as incomes have risen over the past two centuries. But the assertion deserves both qualification and comment. There were branches of manufacture in which growth rates, measured in terms of employment, outstripped those of most tertiary industries.⁹ Indeed the same was true of one major element within the primary sector. Coal production and employment in the coal mines rose rapidly for many decades prior to the First World War, in part because productivity was declining.¹⁰ Equally, there were laggard types of tertiary employment. Female domestic service, for example, grew more slowly than total population between 1851 and 1911.¹¹ And it is important to recognise that, whereas labour productivity was rising substantially almost throughout the primary and secondary sectors, this was far less marked in many tertiary activities. It is improbable, for example, that in the period down to the First World War, the productivity of clerks changed significantly. Indeed, in some kinds of tertiary work, it may have declined somewhat, if measured by a conventional yardstick. A teacher standing in front of a class of 30 children, for example, might be said to be less 'productive' than one with 50 children in front of him or her, yet by a different yardstick the decline in pupil numbers represents an advance. Teaching represent an investment in social capital and the improvement in quality of teaching with a decline in class size may outweigh the decline in quantity.

⁸ . Wrigley, 'Rickman revisited'.

⁹ . For example, the category 'Metal manufacture, machines, vehicles, etc.' increased by 235 per cent between 1851 and 1911. Mitchell, *British historical statistics*, Labour force 2B, p. 104.

¹⁰ . Between 1871 and 1913, for example, coal output rose from 121.4 to 287.5 million tons, or by 137 per cent. The number of coal miners, however, rose even faster, by 182 per cent, from 388,500 to 1,096,000. Church, *British coal industry*, tab. 1.12, p. 86 and tab. 3.11, pp. 304-5.

¹¹ . Mitchell, *British historical statistics*, Population and vital statistics 2A, p. 9 and Labour force 2B, p. 104.

Accurate description and effective analysis of the changes which occurred in the course of the industrial revolution has been much handicapped by the paucity of reliable quantitative information about the scale and timing of these changes. Production series for many industries, for example, are either impossible to obtain or subject to wide margins of error. Sources providing information about occupation, however, are comparatively abundant and, since changes in the occupational structure of the country and of regions within the country can prove immensely helpful in clarifying the speed and location of economic change, it is sensible to devote increased attention to them. They are a particularly attractive source because the data are often available for units as small as the parish, thus enabling the geography of change to be established.¹² Both change over time and in the spatial distribution of occupations are informative and illuminating when studying the transformation which was in train.

The division of occupations into primary, secondary, and tertiary sectors is not new. It was employed many years ago by Colin Clark. The three central chapters of the second edition of his book *The conditions of economic progress* were devoted to a discussion in turn of each of these three categories. It is of interest that he referred to William Petty's writings in justifying the value of this approach. He quoted with warm approval Petty's comments on the benefits of a change in occupation structure: 'There is much more to be gained by *Manufacture* than *Husbandary*; and by *Merchandise* than *Manufacture*'.¹³ And he went on to note how Petty had pointed out that the prosperity of the Netherlands sprang from its success in achieving an occupational structure in which manufacture and commerce figured prominently.

Since the classification of occupations was secondary to Clark's other research interests he provided only a brief summary of his basic tripartite scheme. He wrote:

For convenience in international comparisons, production may be defined as primary, secondary and tertiary. Under the former we include agricultural and pastoral production, fishing, forestry and hunting. Mining is more properly included with secondary production, covering manufacture, building construction and public works, gas and electricity supply. Tertiary production is defined by difference as consisting of all other economic activities, the principal of which are distribution, transport,

¹² . Before detailed occupation data are available in the census, the parish registers are particularly useful in this connection, but other sources such as militia lists also contain much detailed information at the parish level.

¹³ . Clark, *Conditions of economic progress*, p. 395.

public administration, domestic service and all other activities producing a non-material output.¹⁴

Clark's tripartite division is very similar to the three basic categories which I have described. His hesitation over the placing of mining is understandable. Mining, he noted, is associated with industrial production far more exclusively than agriculture or other forms of primary production. Mining also differs fundamentally from agriculture in another respect. Medieval philosophers distinguished between fungibles and consumptibles. A field is a fungible since its use in one year does not prevent its use again in the following year. A loaf of bread is consumptible since it can only be eaten once. Agriculture is a fungible activity; mining a consumptible activity. Even the richest mine is eventually exhausted, but a farm can pass from one generation to the next indefinitely. Yet the issue is not straightforward. If mining is treated as part of the secondary sector on the grounds that mineral output is simply a first stage in a manufacturing process, it could be argued that cotton should be similarly treated since it is similarly placed, in contrast with most other agricultural products. Similarly, the use of wood as a source of heat before its supplanting by fossil fuels might suggest a similar conclusion. On balance it seemed to me best to treat mining as a primary activity.

In emphasizing the value of using the PST system in the study of the industrial revolution, I have, in effect, been describing my reasons for constructing it, but it does not follow that its value is restricted to the study of this period of radical change. It is a general purpose system of classifying occupations, applicable wherever an occupational, rather than an industrial or social class analysis, is appropriate.

Some features of the PST system

Each occupation is identified by a four-digit code. For example, 1, 1, 2, 3 is the code for a shepherd; 2,52, 1, 2 for a watch maker; 3, 2, 1, 1 for a dealer in hops; 4, 1, 4, 3 for a fishmonger. The first digit for the watch maker (2) indicates that he is within the secondary sector, the second (52) that he is in an instrument-making industry, the third (1) that the industry in question is clock and watch making, and the fourth (2) that within that industry he is engaged in making watches. The first digit defines the **sector**, the second the **group**, the

¹⁴. Ibid., p. 401.

third the **section**, and the fourth the **occupation**. As an illustration of the structure to which this system gives rise, consider the case of agriculture which is the subject of table 1.

Table 1 *The agriculture group within the primary sector*

PRIMARY				1, 0, 0, 0
	<i>Agriculture</i>			1, 1, 0, 0
			agriculture, other	1, 1, 0,60
			direction, supervision of agriculture	1, 1, 0,80
		Farming		1, 1, 1, 0
			farmer	1, 1, 1, 1
			yeoman	1, 1, 1, 2
			husbandman	1, 1, 1, 3
			others farming a holding	1, 1, 1, 4
			grower of minor crops	1, 1, 1, 5
			servant in husbandry	1, 1, 1, 6
			agricultural labourer	1, 1, 1,30
			farm work, other	1, 1, 1,60
			management of farming	1, 1, 1,80
		Animal husbandry		1, 1, 2, 0
			horse husbandry	1, 1, 2, 1
			cattle husbandry	1, 1, 2, 2
			sheep husbandry	1, 1, 2, 3
			pig husbandry	1, 1, 2, 4
			poultry husbandry	1, 1, 2, 5
			labourer, pastoral	1, 1, 2,30
			animal husbandry, other	1, 1, 2,60
			management of animal husbandry	1, 1, 2,80
		Gardens, tree and bush crops		1, 1, 3, 0
			market gardener	1, 1, 3, 1

			gardener (domestic)	1, 1, 3, 2
			tree crops	1, 1, 3, 3
			bush crops	1, 1, 3, 4
			garden labourer	1, 1, 3,30
			gardeners, other	1, 1, 3,60

Note. Each element within a four-digit code number occupies two spaces both when it consists of a single digit and when it consists of two digits. This simplifies sorting when using programs such as Excel.

In general the final digit of the four defining a particular occupation rises sequentially. Thus, horse husbandry is 1, 1, 2, 1; cattle husbandry 1, 1, 2, 2; sheep husbandry 1, 1, 2, 3; and so on. There are, however, exceptions to this rule. Labourers in whatever industry they occur are always given 30 as their final digit, so that an agricultural labourer is 1, 1, 1,30, a miller's labourer is 2, 1, 1,30, and so on. This makes it a simple matter to establish the total number of labourers in the population covered. Similarly, the final digit 60 indicates 'others' in a given occupational category. For example, included in farmwork, other (1, 1, 1,60) are the following: chaff cutter; delver; ditcher; drainer; enclosure fencer; farmwork, other; harvester; hedger; hind; ox driver; ploughman; sower; and thresher. The final digit 80 includes all those in direction and supervision within the occupational category in question. And there is one further comparable final digit; all clerks end with 40. Thus 1,20, 1,40 is a colliery clerk, while 5,10, 0,40 is a warehouse clerk.

It might be supposed that because PST stands for primary, secondary, tertiary there would only be three sectors. There are, however, advantages in having a larger total of sectors. PST has eight sectors. The last two of these sectors are residual categories. The reasons for splitting the tertiary sector into four component elements is discussed below. Table 2 lists each of the eight sectors and shows the number of groups and sections in each sector.

Table 2 *Sectors, groups, and sections*

Sector	Number of groups	Number of sections
1. Primary occupations	7	18
2. Secondary occupations	37	154

3. Tertiary occupations (dealers)	30	102
4. Tertiary occupations (sellers)	28	63
5. Tertiary occupations (services and professions)	16	64
6. Tertiary occupations (transport and communications)	7	11
90. Sectorally unspecific occupations	0	0
99. Without occupations or unstated	3	6

The first sector, primary occupations, needs little comment. It consists of activities such as agriculture, animal husbandry, forestry, and fishing representing the produce of the land and water. As already noted it also includes mining, even though there is a persuasive argument for treating it as belonging to the secondary sector.

Secondary occupations are equally straightforward. They consist of all those occupations which play a part in converting raw materials into a finished product. They therefore always involve the production of material objects of value to man, normally by using a physical or chemical process to convert the output of primary industry into a form which will command a price in the market place in an advanced economy, or be used or consumed in a less developed setting.

The second, third, and fourth PST sectors are closely related and this fact explains the specification of the first two tertiary sectors as dealers and sellers. The numbering of the making, dealing, and retailing of a given product is the same apart from the initial digit so that it is possible to discover very simply the total employment relating to a given type of production. For example, those making carpets, mats, and rugs form the section 2,35, 1, 0; those dealing in the same products are placed the section 3,35, 1, 0, while section 4,35, 1, 0 consists of those selling them. Table 3 provides an illustration of the same point. It is often of interest to be able to track the scale of employment generated at each stage in the production, distribution, and sale of a given class of articles and this numbering convention makes it easy to do so.

Table 3 The interconnection between secondary and tertiary employment: the production of pottery and chinaware, and those dealing in, and selling these products

Pottery, chinaware		2,45, 2, 0	Dealers in pottery, chinaware		3,45, 2, 0	Pottery, chinaware sellers		4,45, 2, 0
	pottery	2,45, 2, 1		pottery dealer	3,45, 2, 1		pottery seller	4,45, 2, 1
	chinaware	2,45, 2, 2		china dealer	3,45, 2, 2		china seller	4,45, 2, 2
	pottery, chinaware labourer	2,45, 2,30						
	pottery, chinaware manufacture, other	2,45, 2,60						

The fifth sector covers the rest of the tertiary sector other than transport. It includes domestic service; food, drink, and accommodation; entertainment; the media; financial services; commercial services; the professions; local and national government services; the armed services; owners of capital; miscellaneous service industries, such as sanitary services and laundry work; and those identified by title such as the royal family and the nobility.

The sixth sector is devoted to transport. This formed one of the most rapidly growing of all occupational groupings during the early modern period and the industrial revolution. The volume of transport both overland and by water increased dramatically and manpower productivity rose sharply in many types of transport activity. And there were, of course, major changes in transport media, beginning with canals and turnpike roads, then railways, and later the radical changes associated with the internal combustion engine and the advent of travel by air.

There remain two further sectors, one devoted to sectorally unspecific occupations such as worker or labourer; the other consisting of those either without an occupation or whose status was uncertain, such as vagrants, beggars, prisoners, pensioners, et sim.

The processing of occupational data

Consider first data relating to individuals. There are three stages in the treatment of a given entry. The first stage might be described as a process of standardisation. The original character string may be either misspelt (by the conventions prevailing today) or contracted. For example, an upholsterer may be recorded as 'uphostrer' and agricultural labourer is often found as 'ag. lab.'. There are also innumerable different ways of spelling 'smith'.

Regularising entries in this fashion constitutes the first stage in processing a particular entry. The second stage consists in ensuring that all the occupations produced by the first stage are recognised in the 'dictionary'. The dictionary consists of an exhaustive list of all distinct occupations. It currently consists of well over 2,500 occupations but there are vastly more descriptors after the completion of stage one than are listed in the dictionary. Stage two consists of the translation of any descriptor which is not represented in the dictionary into one which is so represented. For example, stocking maker is in the dictionary but stockinger is not although it describes the same occupation. Therefore all stockingers are treated as stocking makers as the allocation process moves forward. There are many other synonyms for stocking maker which are similarly treated, as, for example, stocking weaver, stocking worker, or stocking knitter. Translations of this type are straightforward. Occasionally, two descriptors may be treated as referring to the same occupation even though at first sight they might be thought very different, as with shoemaker and cordwainer, for example. In the third and final stage there is a further marked reduction in the number of separate entities. All dictionary entries are allocated to particular PST categories. For example, in PST the occupation 2,65, 2, 4 is 'edgetool manufacturer'. In the dictionary there are sixteen occupations in this occupational category, including, for example, file cutter, saw maker, cutler, scissors maker, and auger maker.

Each new body of data is likely to include character strings which had not previously occurred, and occasionally, where the occupation differs from any already in the dictionary, this will also give rise to an addition to the dictionary. The PST system itself therefore develops as it is more extensively employed.

Where a dual occupation is stated both occupations are recorded, and, although the individual is initially processed by the first of the two occupations stated, it is planned that at a later stage it will be possible to make use of both descriptors, as, for example, by giving each half weight in any later tabulation of the data. It is important to recognise that there are also single occupational descriptors which in the past effectively referred to a dual occupation, given the nature of the PST system. Baker is an example of this dilemma. Most bakers were both makers and retailers. As with cases in which there was explicitly a dual occupation, therefore, it may be appropriate to recognise this fact in further analysis.

Census data presents a different set of problems. In one sense they are much simpler. There are, for instance, only between five and seven hundred different occupations listed in nineteenth century British censuses. On the other hand, they often allow allocation only to a given group rather than a section because they have aggregated into a single category a range of different occupations. A particularly recalcitrant problem arises when the census term bridges between two different sectors, as in the case of 'bonnet maker/dealer' to which reference was made previously.

More complex systems of classification

If a system of classifying the attributes of the posts occupied by individuals is made sufficiently complex it is possible to combine the characteristics which are normally found only in separate systems. For example, both the 'industry' and 'occupation' of an individual can be recorded. A man who was an accountant but working for a mining firm could be classified in such a way that he could be counted for one purpose as an accountant with other accountants but for another purpose as working in the mining industry. Or again, both occupation and status can be indicated so that the occupant of a senior administrative office within a given organisation could be distinguished from those lower down the hierarchy. Additional digits on the line of coding against an individual or group of individuals would enable this to be achieved and the body of information as a whole could be sorted in such a way as to preference either industry, or occupation, or social status.

A complex coding system which accommodated these possibilities, however, though feasible in principle, might seldom prove useful in practice. If the input data were drawn from a census or comparable source the information would already have been structured to conform to the conventions employed by the body which had secured the data. It would already have an 'industrial' or an 'occupational' format which would often offer only limited opportunity for conversion to a different system. If the input data were individual descriptors, as with entries in a parish register or on a militia list, it is likely that many of the descriptors recorded would only allow one type of analysis. A man recorded as a 'stoker', for example, can be given an occupation but may have been stoking a furnace in a dyeworks or on a railway train. Sometimes in sources of this type the entry does allow alternative allocation. A 'mining engineer', for example can be classified both by occupation and

industry, but few sources consistently yield such opportunity, except in the case of original returns in some censuses where the question may be phrased in such a way that it ensures that each individual can be classified both by occupation and industry.

Three PST resources can be download from the project website at <http://www.geog.cam.ac.uk/research/projects/occupations/britain19c/pst.html> These include: a definition table for PST which sets out the full structure of PST; a PST dictionary which lists all the distinct standardised occupations currently in PST and their associated PST codes; a look-up table which contains all the original occupational descriptions, the associated standardised dictionary occupations and the associated PST codes. The look-up table can be used to code occupational data-sets to PST. For any pre-census occupational dataset it is likely to code the great majority of occupations in any dataset of male occupations.

PST and other occupational systems

There is a sense in which it should always be possible in principle to move between one system of recording occupation and another. Provided that the systems in question have a complete dictionary of occupational descriptors, any body of raw data relating to individuals can be processed according to the rules of any given occupational system. If, however, the data are available only at a later stage of processing, their current form may make it impossible to effect an accurate translation. If, for example, one system groups all miners as a single category, it will not be possible to distinguish between, say, coalminers and tin miners, whereas a different system may have a series of mining categories, corresponding to each type of mineral. Each stage in the aggregation of raw data within a given system of occupational classification progressively limits the possibility of converting the occupational information structured according to one system to conform to the character of a different system.

HISCO

One occupational classification system was explicitly designed to ‘enable researchers from a variety of countries to communicate with each other and make international comparisons across the nineteenth and twentieth centuries in social, economic, and other

fields of history.’¹⁵ The system, named HISCO, which stands for ‘historical international standard classification of occupations’ was adapted from ISCO, an existing system developed by the International Labour Organisation. The ILO produced successive editions of their system; HISCO was based on ISCO68 which the ILO hoped would ‘provide a systematic basis for presentation of occupational data relating to different countries in order to facilitate international comparisons’ and further ‘to provide an international standard classification system which countries might use in developing their national occupational classifications.’¹⁶ The authors of HISCO remark that ‘A defining moment in the early development of the HISCO scheme was the decision not to start from scratch, but to historicise a system with proven comparative credentials.’¹⁷

It is a major virtue of HISCO that it is not limited to dealing with occupations described in one language. There are occupational dictionaries in Dutch, English, French, German, Norwegian, and Swedish. The same coding can therefore readily be found for, say, a tobacco blender or a glass blower in any of the six languages. HISCO is not, however, well adapted to the ends served by PST. The major groups within HISCO illustrate the different principles in the two schemes. They are as follows: professional, technical and related workers; administrative and managerial workers; clerical and related workers; sales workers; service workers; agricultural, animal husbandry and forestry workers, fisherman and hunters; production and related workers, transport equipment operators and labourers. This system frequently results in persons engaged in the same industry being widely separated. For example, ships’ officers are in the first of the major groups. Their designation is 0-42 (ships’ deck officers and pilots), whereas sailors are in 9-89 (ships’ deck ratings, barge crews, and boatmen). There are many similar cases. They arise because those in senior positions in a given industry or profession are classified with those in comparable positions in other industries. Their separation from others in the same industry reflects differences in training and professional attainment. This is, needless to say, an entirely proper basis for categorisation but it is significantly different from the logic of PST. As a result direct translation between the two systems poses problems. Indeed the two systems are so different that it is fruitless to attempt it between the major categories in HISCO and PST. Difficulties

¹⁵ . Van Leeuwen, Maas, and Miles, *HISCO*, p. 9.

¹⁶ . Van Leeuwen, Maas, and Miles, *HISCO*, p. 10.

¹⁷ . Van Leeuwen, Maas, and Miles, *HISCO*, p. 10.

become progressively less serious when starting from more detailed categories. HISCO is a three-digit system (major groups, minor groups, and unit groups). The closer one moves to the original occupational descriptors, the easier it is to be confident about equivalence. Indeed, if one starts from the original descriptors relating to individuals, the problem disappears since no decisions have been pre-empted. This in turn means that the body of the data derived from parish register material can readily be expressed either in PST or HISCO terms, but census derived data may prove more obdurate.¹⁸

Conclusion

It is easy to exaggerate the differences between PST and other ‘occupation’ systems, or indeed those with an ‘industrial’ base in most of their characteristics. There are two significant differences with most other systems, however, to which attention may be drawn. The first is the grouping of all occupations into just three sectors: primary, secondary, and tertiary. The reason for doing so have already been discussed, but it is worth repeating that the value of this approach lies in the help which it should afford in describing and analysing the transition from an organic economy to one in which the energy constraint which had limited growth in earlier centuries is gradually overcome, in other words the occurrence of an industrial revolution. The second difference is the development of a classification system which makes it easy to link the manufacture of a product, a secondary sector activity, to dealing and selling the product, a tertiary sector activity. It is, for example, illuminating to be able to assess the relative number of dealers and sellers of a given product, or to consider the numbers engaged in producing a given product with the total of those involved in transferring the product to its ultimate consumer or user. Given the nature of the numbering system in PST investigations of this kind can be carried out very simply.

¹⁸ . The wish to be able to make use of a system intended for international use is, nonetheless, attractive. Accordingly, a translation of PST codings into HISCO codings has been devised. Wrestling with the problems which came to light in producing this system, however, showed that the equivalences are only approximate in some cases.

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