

Chapter 2

From the Facts in Society to Socio-Economic Data

2.1 Socio-Economic Phenomena – The Starting and End Point of Statistics

The intent of this chapter is to clarify the nature of socio-economic statistical data, and the role statistics is playing in capturing socio-economic phenomena. This role has been seldom discussed but is a fundamental issue concerning the nature of socio-economic statistical data,¹ and the manner in which they convey socio-economic reality. The following discourse may strike some readers as unnecessary, perhaps as not even belonging to statistics. Yet, a good understanding of this preliminary phase should provide the user of statistical data with an understanding of the data-creation process as an important first step of interpretation.

2.1.1 Flaws in the Perception of Socio-Economic Reality

To properly interpret data, an understanding of the nature of the elementary building blocks,² the ‘statistical-counting-units’ and their role in portraying economic phenomena, is needed. A comparison suggests itself with the role that atoms and molecules are believed to play in the physical world. The ‘statistical-counting-units’ could be thought of as the equivalents of the atoms in physics. The summation of these statistical-counting-units in statistical aggregates could be compared to molecules that are made up of such atoms. These molecules then make up the substance of objects, which then are somehow comparable to phenomena in the social sciences. Despite the appearance of simplicity and mathematical precision of statistical data presenting socio-economic phenomena, like ‘price level,’ ‘unemployment,’ or the GDP, these phenomena and the data portraying them, are more ambivalent and elusive than is commonly realized.

2.1.1.1 The Socio-Economic Phenomena

Let me start with the beginning of any statistical investigation: defining the phenomenon to be studied, what it is, where and when it can be found, and how

it should be captured statistically. To repeat the obvious, the phenomena in society are quite different from phenomena in the natural sciences. They also differ in the manner in which 'real-life-objects' project the socio-economic phenomena.³ The temperature at which water reaches the boiling point, for example, should be expected to be the same in socialist China as in capitalist USA, in a stone age community in Australia's outback as in a futuristic community in California. Aside from the influence of the barometric pressure – depending on the altitude above sea level – the boiling point of water was probably the same during the time of the French Revolution as during the Punic Wars of ancient Rome. Minor changes may have occurred in reaction to changes in our solar system and in the galaxy to which it belongs. It seems unlikely that a research grant would be available for studying differences in the boiling points of water between cultures, in different continents, or in different historical epochs. Compare this with research in the social sciences where the opposite assumption applies: nothing should be expected to remain the same from one social stratum to another, from one country or culture to another, or even from one month to the next. Social phenomena are known for their rapid change, their unpredictable evolution and their great variety. Statistical data must keep up with this dynamism, and statistical theory ought to be prepared to interpret the phenomena that underlie those data. It should not be a surprise that statisticians have been uncomfortable approaching this topic. They seem to consider a discussion of economic and social phenomena as lying outside the purview of statistics.⁴ Yet, a foothold in this foreign area must be obtained.

It appears that socio-economic phenomena can be abstracted from actual situations of society on at least three levels.

1. At the most abstract level, one might consider phenomena such as The Business Firm, The Production Plant or New Venture Creation.⁵ At such a high level of abstraction a general theory of the firm might be derived from the study of existing firms, regardless of country, culture, stage of economic development, type of product, state of technology, phase in the business cycle, etc. An analogue abstraction in the natural sciences could be the abstract phenomenon 'Tree' derived from the most diverse forms of life without regard to species, type of wood, fruits, leaves, height, shape, climate, location and ecosystem in which it exists.
2. At a less abstract level one can view the same business firms, production plants or New Venture Creation as parts of an economic system, focusing on their interaction with other entities of their kind as sellers and purchasers, still largely disregarding regional and period-specific circumstances, except for the implicit assumption of a free, western-style market society. This less abstracted phenomenon might roughly be identified as an 'Industry,' and may be as different from the socio-economic phenomenon 'Business Firm' as the natural science phenomenon 'Pine Forest' is from 'Tree'.
3. At an even less abstract level these same Business Firms represent even more concrete phenomena in socio-economic situations in which the location, state

of development at a given time, type of products it deals with, and many other particulars that define such a business firm are not abstracted and assumed away to the same extent. Possible examples might be the Steel industry in Sweden at the turn of the century, or the British leather industry in the decade following World War II.⁶ These phenomena are as different from the previous phenomena as the phenomenon 'Washington National Forest of West Virginia in the 1980s' is from the more abstract, general phenomenon 'Pine Forest.'

Each one of these three levels of phenomena is embodied or projected by the same factories, to stay with the example of a production plant, but at different levels of abstraction. One might say that the natural sciences, and imitating them, (micro) economic theory, mostly deals with phenomena at levels of abstraction 1 and 2, econometrics with levels 2 and 3, but socio-economic statistics mostly with levels 3 or higher numbered levels not listed here, of even less abstract, more concrete phenomena.

A typical case, illustrating the need for statistics to clarify a social and cultural phenomenon, could be poverty, before one can even consider collecting data and planning future tabulation of results.⁷ It should also be noted that the need to clarify such social phenomena as 'business firm' 'unemployment' or 'work accident' has led to the creation of national and international agencies like the Bureau of Labor Statistics of the US Government's department of Labor (e.g. for NAICS, the North American Industrial Classification) (ILO) the International Labor Organization and (ISI) the International Statistical Institute.

2.2 The 'Projecting Agents' of Socio-Economic Phenomena

In sociology, economics, management, and other business areas, specific socio-economic phenomena are portrayed or projected by specific items, events, buildings and all kinds of things such as e.g. cars and in general, 'durable consumer-goods.' These 'projecting agents' can also be contractual documents that seem to exist only as a piece of paper but are anchored in the laws and customs of society. All of these will be referred to in the following as 'real-life-objects.'

Socio-economic phenomena, at all levels of abstraction, are projected by appropriate 'real-life-objects' as the 'projecting agents', somewhat like the invisible field of a magnet is projected by iron filings scattered on a sheet of paper placed on top of that magnet. The iron particles become projecting agents of the phenomenon 'magnetism' by their reaction to these polarizing forces that exert an effect on these particles. Quetelet's example of a circle drawn with chalk on a blackboard comes to mind although he intended to illustrate with it the 'Law of Large Numbers.' When looking through a magnifying glass, he relates, the individual chalk particles can be seen, spread randomly over the rough surface of the blackboard. When looking at all those particles together, however, the shape of their array in a circle, which in this instance is the phenomenon, becomes evident.⁸

After the appropriate branches of the social sciences have defined a social or economic phenomenon to be investigated, it is the task of statistics to identify, locate and record those ‘real-life-objects’ that portray that phenomenon.

2.2.1 Different Types of ‘Real-Life-Objects’

Understanding those ‘real-life-objects’ is a first step of data interpretation. A great variety of such ‘real-life-objects’⁹ exists, that act as projecting agents¹⁰ for socio-economic phenomena. Human beings are the most important of the great variety of ‘real-life-objects’ that are of interest to society – no offense is meant when referring to human beings as ‘real-life-objects’ as a technical-statistical term. It can be an individual person, or a group of persons, like a ‘family’, a ‘household’ or other groups of people, e.g. in a mental institution, in hospitals, jails, or retirement homes.

These ‘real-life-objects’ can also be things related to socio-economic activities, such as mines, farms, retail establishments, production plants, railroad companies (with their rail network), corporations, but also machines, farm animals, and produced goods. Political-administrative districts can become ‘real-life-objects’, such as counties, metropolitan areas, census tracts, even plots of land cultivated with certain field crops. Other, quite different kinds of ‘real-life-objects’ can be legal documents like shares, mortgages, vehicle registrations, birth certificates, building permits and bonds.

The most frequent kind of ‘real-life-objects’, however, are neither people nor buildings or things. They are occurrences of social relevance, such as sales, strikes, accidents. Into this category of ‘real-life-objects’ belong events that are *beginnings* e.g. the birth of a person, foundation of a firm, issuance of a share, the issue of a construction permit or the creation of a new job, *changes* e.g. in the occupation of a person or in the line of production of a firm, and *terminations* e.g. the withdrawal of a person from the labor force or the conclusion of a debt through full payment, the completion of the construction of a dwelling unit or the bankruptcy filed by a business firm. These occurrences can become the ‘real-life-objects’ of interest, independently of the persons, things or events in which they occur. These beginnings, changes and endings are of interest independently of the ‘real-life-object’ in which they occur, though always in relation to it, whereby the description of the ‘real-life-object’ in (or on) which an occurrence takes place becomes one of its characteristics. An example would be the opening of a new supermarket, where the ‘real-life-object,’ the beginning of a firm, is characterized by the size and kind of business in which it occurs.

2.2.2 Substance and Individuality of ‘Real-Life-Objects’

These ‘real-life-objects’ differ widely regarding their physical substance. On one extreme are those that consist predominantly of a physical mass like lumber, coal,

gasoline, cement, fuels and raw materials. These are needed to project socio-economic phenomena such as importation, exportation, or as the input of certain raw materials in a production process. The problem with them is that they lack natural units that can be counted and measured.

On the other extreme are 'real-life-objects' that have only a symbolic substance: a mortgage, the piece of paper that represents that financial contract and is part of the important phenomenon 'long-term investment.' Occurrences usually have only a minimal physical substance: a birth certificate or a marriage license. Some occurrences have no physical substance at all such as a business transaction in which merchandise and money is exchanged informally, without a written record – the substance of the traded merchandise must not be confounded with the substance of the transaction itself, which is the 'real-life-object' properly speaking from a statistical point of view. Such lack of a physical substance in 'real-life-objects' causes the problem of under-reporting because of the difficulty in locating and recording them.

A different, though related matter, is the individuality of these 'real-life-objects'. It refers to their appearance as something clearly distinct from their environment and from other 'real-life-objects'. A 'real-life-object' may consist of one single piece or unit, such as a car. At times a 'real-life-object' may consist of various individual pieces, each of which could become a 'real-life-object' in its own right. A 'Corporation,' for example is a 'real-life-object' of one kind. Its various retail establishments or production plants can become separate 'real-life-objects' in which case they represent a different kind of economic phenomenon.

The delimitation of the individuality of an object often suggests itself naturally, such as in a motor vehicle, farm animals, or fruit trees.¹¹ This is not the case in a variety of socio-economic 'real-life-objects' whose individuality must be defined by the social scientist, such as e.g. a business firm, an I.O.U., a work-accident or a strike. Raw materials, many semi-finished products, and fuels present problems in this regard. Bulk products like cement, cotton, chemicals, lumber, oil, coal, electricity or gas do not have naturally individualized pieces that one might use as 'real-life-objects.'

Other materials do have individualized pieces, but the exact determination of their number and characteristics is not worth the trouble, such as metal screws, nails, apples, bricks, pencils or cigarettes to give a few examples. In such instances the weight, length, surface or volume of their physical bulk is substituted, such as tons, bushels, board feet, KWH, or certain forms of packaging, such as barrels (oil), sacks (potatoes), crates, bales, or even the 'production of the day.' These are not truly individualized objects but pseudo-objects. The number representing the measure of their weight or volume are scale units of measurement, not, as is sometimes mistakenly believed, individual objects. Such units-of-measurement, as stand-ins, are pseudo 'real-life-objects' that are treated as homogeneous, in contrast to individualized 'real-life-objects' that can be quite heterogeneous and require a correspondingly more sophisticated statistical approach.

2.2.3 *Life Span and Timing of ‘Real-life-Objects’*

Every ‘real-life-object’ has a duration or life-span, no matter how short it may be. That life-span has a beginning, various phases of development, and an end. (e.g. see Fig. 7.1) No object really exists as just a point in time, even if for practical purposes it may be treated as such. Beginnings, changes and terminations themselves usually are complex occurrences. The establishment of a new business firm, for instance, may take months. It is a lengthy process which itself has a beginning, duration, and a termination. The onset of the beginning may be considered in even finer detail and further phases might be distinguished about it, such as a beginning e.g. the moment at which this beginning phase actually is initiated, a development of this early stage, and an ending, which is the point in time when this beginning stage is terminated. The possibility of such refinements has a certain importance for the precision with which real-life-objects can be recorded statistically, and to clarify some old problems in statistics like ‘the index-number-problem’.¹²

The issue of when exactly a ‘real-life-object’ is captured statistically can be important. It allows to link-up each object with other ‘real-life-objects’ in a ‘historic landscape’. This matter is important because statistical survey procedures tend to isolate ‘real-life-objects’ from their actual surroundings, thereby tending to ignore potentially important information about their socio-economic context. More about this will be discussed in Chap. 5, Longitudinal Analysis-Part 1 – Looking to the Past.

2.2.4 *Location, Extension and Mobility of ‘Real-Life-Objects’*

Every ‘real-life-object’ has a definite relation to its location. Reference to it as the ‘geographic characteristic’ treats location as an intrinsic quality of an object, at a par with other characteristics. This assessment is inaccurate, however, and prevented statistical theory from dealing with the geographic dimension of socio-economic phenomena. Regional phenomena differ due to the special economic and environmental characteristics of each area, which are implied and summarily stated through a ‘real-life-objects’ geographic location. Even ‘real-life-objects’ with only a symbolic, minimal physical substance like the *sale* of a car or the *issuance* of a mortgage happen in a place on the map. The geographical location on which a sale takes place, though not an attribute of the ‘real-life-object’ ‘sale’ is, like the time at which it happened, important for grouping these objects into meaningful aggregates (more in Chap. 3).

Every object also has a geographic extension. A farm occupies a certain amount of land with certain surface and soil characteristics. So does a strike which takes place in some production plant. The plant’s physical and geographic extension is usually also the geographic extension of that ‘strike.’

Objects can be fixed or mobile with regard to their location. Most ‘real-life-objects’ are neither absolutely fixed, nor completely mobile. Even houses and large firms have been moved to different locations. It is the high mobility

of some 'real-life-objects' that creates problems for statistics. Examples are the whereabouts of the rolling stock of a trucking firm or of a railroad company. These problems create uncertainty, not unlike the measuring problems in atomic physics.

2.2.5 *Attributes and Variables*

These 'real-life-objects' project an economic phenomenon through their properties. The attributes – qualitative characteristics or non-measurable variables – of these real-life-objects describe pervasive, essential aspects of an object, through non-numeric, nominal description. They cannot be determined with accuracy or measured on an interval or ratio scale. Quantitative characteristics, on the other hand, expressing intensity or the magnitude of some feature, can be determined accurately, but contribute little to characterize the object.¹³ Both kinds of determining the characteristics of a 'real-life-object' are needed as mutual complements.¹⁴

Every property which characterizes a 'real-life-object' may be understood as a partial description of its nature. Behind the customary distinction in qualitative characteristics (attributes) and quantitative characteristics (variables) really is another distinction, according to the width of the segment of the integral nature of the 'real-life-object' which is provided by a given characteristic. Qualitative characteristics capture in literary form essential and pervasive aspects of the 'real-life-object,' but cannot be determined succinctly. The wider that slice out of the nature of a 'real-life-object', a specific attribute, the less precisely can it be determined. The so-called quantitative characteristics, on the other hand, refer to narrow segments of the nature of the 'real-life-object' which can be determined more accurately. The narrower this segment, the **more precisely** it can be captured (measured), but **the less information** is obtained concerning that 'real-life-object'.

As a first approximation, a wide part of the nature of a 'real-life-object' is described through a qualitative characteristic. In consecutive, progressively finer determinations (descriptions) the nature of that initial segment of the 'real-life-object' is then further defined. At the end of such a wedge-like penetration into the nature of the 'real-life-object', quantitative, measurable characteristics can add the sharpness that was missing in the initial description by the attributes. The same holds for the tabulations made of such characteristics of the 'real-life-objects.'

When the 'real-life-object' is an occurrence, it is also characterized by the 'real-life-object' to which it belongs, or on which it is happening. The characteristics of non-individualized 'real-life-objects,' e.g. raw materials, are summarily estimated. From the socio-economic point of view they usually are of little interest – although they may be of interest e.g. from a quality-control, that is, engineering point-of-view.

To summarize, the *qualitative* description alone is imprecise, e.g. a firm described only by the nature of its products. The *quantitative* description alone has little meaning, e.g. a firm described only by the number of its employees, or the size of last month' sales, without an indication of its qualitative characteristics like the industry to which it belongs, the kind of products, form of ownership, capital structure, etc. The description of a 'real-life-object' by attributes does not need to be supplemented by quantitative characteristics – measurements – in order to be comprehensible.

The analysis by attributes is Basic, but the description by one or more quantitative variables alone is not meaningful. Quantitative Variables are only complementary.

These observations should alert the user of data to first clarify these issues by asking questions, using the answers as the first tool of a meaningful interpretation of data. This understanding also underlies the structure of this book, where Chaps. 3 and 4 discuss the qualitative nature of data, followed by a discussion of their development through time, in Chaps. 5, 6 and 7. The quantitative characteristics, usually treated at the outset, are discussed in this book in Chaps. 8 and 9, only after the statistical issues with qualitative characteristics.

2.3 From ‘Real-Life-Object’ to ‘Statistical-Counting-Unit’

‘Quod non est in acta, non est in mundo’

(What is not on record, does not exist – A basic tenet of Roman law.)

The printed socio-economic data do not directly deal with the ‘real-life-objects’ that were discussed, but with simplified statistical sketches of these, that I would like to call the ‘statistical-counting-units.’ It is these that are tabulated, not the ‘real-life-objects’ themselves. The user of statistical data knows only about those ‘real-life-objects’ of which questionnaires or computer accessible evidence – the ‘statistical-counting-units’ – exist. A clear distinction must be made between the ‘real-life-objects’ out there in reality, and the ‘statistical-counting-units,’ the sketches of these ‘real-life-objects’ in electronic or in other storable form. That seemingly subtle distinction, however, is important and must be kept in mind when interpreting socio-economic data (Fig. 2.1).

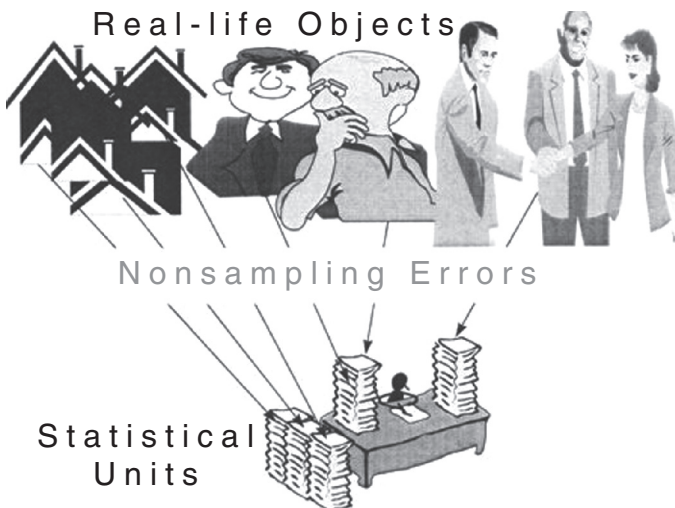


Fig. 2.1 From the real-life object to the ‘statistical-counting-unit’

2.3.1 Surveying the 'Real-Life-Objects'

The process which transforms the 'real-life-objects' into 'statistical-counting-units' usually is the statistical survey. It can be a census, a sample, or some administrative listing that exists for other purposes but is made available to statistics.

Known is the population census. There are other, less known economic census operations: census of agriculture, of mining, manufacturing, whole-sale-retail establishments, and service industries. Even less known is the US census of governments, in which the local governments in the US are the real-life-objects. Because a census is a costly, major operation that requires a legal basis, a professional staff and big budget allocations, it is carried out only at 5 or 10 year intervals, and the different censuses are scheduled at different times because of the limited administrative capacity of census bureaus.

Another matter are the abundant sample surveys. Unless they are undertaken by a public or private professional sampling organization, they seldom serve a serious statistical purpose, but are used as a pretext to draw attention to a new product or some political cause.

Statistical theory has spent much thought and effort on improving the sample design in selecting the real-life-objects and managing the inevitable (mathematical) sampling error. As already mentioned, sampling theory and inference has dominated the discussion of statistics at the expense of nearly everything else.

This statistical process extracts from the rich reality of the existing 'real-life-objects' a simplified – and often distorted – sketch of it on a questionnaire or other means of recording. It is a reduction process that is not reversible: The real-life object, e.g. a human person, cannot be reconstructed from a questionnaire, regardless of how much detail it contains and how conscientiously it has been filled out. Furthermore, once recorded, each 'statistical-counting-unit' starts its own existence, separate from, and independent of that of the real-life object. Even if the latter should disappear completely, the 'statistical-counting-unit' remains, as a lasting testimony to the former's existence. When tabulated, it survives even the destruction of the original record, on a questionnaire, punch-card, magnetic tape, CD or other device.

Statistical surveys record the real-life-objects in isolation from their socio-economic context. Usually real-life-objects of one kind are enumerated together, such as the dairy farms located in a country in a census of agriculture. Different types of real-life-objects are surveyed at different times, by different agencies, usually according to different criteria and definitions. No integral census has yet been accomplished that would report together human beings, factories, farms, mines, wholesale and retail establishments, banks and other service establishments, with their relevant characteristics. This inability to survey the entire society and its activities together, at the same time, results in discrepancies and variations in the data that have nothing to do with chance occurrences in the economy, but result from the truncation of socio-economic phenomena through the statistical process.

2.3.2 The ‘Statistical-Counting-Units’

It is interesting to consider the differences between “measurement” in the natural sciences and the corresponding statistical activity in the social sciences. In the natural sciences these measurements are the result of observations by objective especially trained observers, like in the bio sciences, so to speak from the outside of the thing to be measured. In the socio-economic setting the person providing the information e.g. in a population survey, really is the “object” to be observed. That self-reported information from many different informants of varying competence and intelligence is collected by survey takers, who themselves often are insufficiently prepared for that task, acting mostly as mail carriers, not like the observers in the natural sciences. The truthfulness and accuracy of such information depends on the cooperation of these interviewees, a matter that cannot be guaranteed, despite existing laws that require it. Neither their honesty nor the accuracy of their memory can be guaranteed. That is a fundamental, important difference between socio-economic statistical data and the measurement data in the natural sciences.

Statistical data have been variously classified. The distinction in ‘Punkt- and Streckenmassen’¹⁵ (point- and line masses), for example, is based on the length of life of the real-life-objects: some real-life-objects are perceived as being points in time, of short duration. Others last long, occupying a ‘Strecke’ that is, a considerable stretch of time. But every real-life-object has a certain duration. Considering its life span as point-like and short, or as long lasting, is a relative matter. Moreover, this distinction ignores the fact, that we do not deal with the real-life-objects themselves but with the ‘statistical-counting-units’ which are, by their nature, points in time and space, regardless of the length of life of the real-life object.

Another distinction in ‘Bestands- and Bewegungsmassen’ – inventories of a mass of stationary real-life-objects and masses of moving real-life-objects that are not stationary – is based on the spurious distinction between existence-units which are real-life objects that remain in their location without moving, and motion-units, that is, real-life objects that are on the move, without a fixed relation to a place in a geographic region. That obscures the fact, that every ‘statistical-counting-unit’ is a static record, fixed in a certain time and location, regardless of whether a real-life-object is static or dynamic.¹⁶

A distinction could be made between different types of ‘statistical-counting-units’ according to the occasion of their registration:

1. Real-life-objects are contacted by mail, telephone or personal visit by a concerted effort to record them, and approached at a certain point in time as in a census or sample survey, or
2. A government or private institution records the real-life object on the occasion of some event that triggers a registration, such as a beginning of something, a change of its characteristics, or its termination, carried out for other than statistical purposes. Typical is the registration of the birth of a child, the issue of a building permit for an addition to an existing building or for a new building, the registration of the bankruptcy of a firm (death), or the periodic re-registration of motor vehicles. In most of these instances the registration is requested by law,

is carried out as a continuing operation, often for the purpose of taxation, not originally for statistical purposes.

The first type leads to the statistical registration of all real-life-objects of a kind, as a (more or less) simultaneous cross section. On such occasions, events connected to these real-life-objects are also recorded, such as sales and costs during the past year in a census of enterprises.

The second type leads to the formation of 'statistical-counting-units' at uneven time intervals although the point in time at which the real-life-objects are registered can be important. The recording agency acts as a point at which an occurrence is registered, related to the issuing of a license or permit, or acting as a checkpoint for the flow of real-life-objects, like in studies of road traffic. The real-life-object on which the occurrence happens is often also registered. This distinction in cross sectional and longitudinal registration is roughly identical to another more familiar distinction: data collected for statistical purposes, and data collected as a by-product of administrative activities.

Both procedures yield still-pictures of the real-life-objects, somewhat like a photographic snapshot – except that less detail is retained. The purpose of such a statistical registration is not really to describe in detail the individual real-life-objects but to capture some socio-economic phenomenon in which that real-life-object is involved. In all these instances, statistical surveys yield still-pictures of the phenomenon. Its dynamism can be approximated through arranging these static still-pictures in sequence over time, such as e.g. yearly inventory figures for business units that are recorded by their accounting departments in a census-type operation, or monthly production totals for factories as the real-life-objects recorded in a continuous registration procedures.

At times various real-life-objects are registered collectively as one figure, such as the cattle on a farm in an agricultural census. No separate 'statistical-counting-units' are recorded on that occasion for each animal in the herd. Similarly, no 'statistical-counting-units' are produced in the case of the production of substances and materials that do not form individualized 'real-life-objects'. In these instances, statistical information bypasses the formation of statistical units, in many instances even omitting to record the number of 'pseudo-real-life-objects' like barrels of crude oil produced. Instead of their number, only their total weight, volume or value is recorded. Similarly, statistics records the Kilo-watt-hours of electricity produced or consumed.

Statistical materials which are prepared from individually recorded 'statistical-counting-units' call for a detailed analysis of all the characteristics of the units which were investigated. Additional computations may help assess the respective socio-economic phenomenon. The more details of the real-life-objects were recorded in the 'statistical-counting-units', the more of the features of the phenomenon can be studied.

Statistical materials which were not prepared from individual 'statistical-counting-units' cannot be interpreted in much detail but become useful in the form of ratios and index numbers.

The schema in Fig. 2.1 visualizes this transition from the real-life object to become a ‘statistical-counting-unit’. For empirical socio-economic studies, the ‘statistical-counting-units’ are the de-facto projecting agents of the socio-economic phenomena, not the ‘real-life-objects’ themselves that exist out there in society. These ‘statistical-counting-units’, then, are the actual building elements of the data in our field. It should be stressed again that one individual ‘statistical-counting-unit’ does not correspond to, nor is it comparable with an individual observation or measurement in the natural sciences. The differences in their respective roles will be further discussed in the next chapter on aggregation.

These ‘statistical-counting-units’ are only of transitory importance. It is their aggregation that yields the data that are of interest and are to be interpreted. A large number of ‘statistical-counting-units’ in an aggregate does not imply a greater validity of a statistical statement; nor does it establish the socio-economic phenomenon with greater certainty. The ‘Law of Large Numbers’ – the Central Limit Theorem – simply does not apply to socio-economic statistical data, except when actual samples are analyzed inferentially. These statistical elements link socio-economic reality ‘out there’ with the tabulated data, the aggregates, ‘in here’. In the next chapter these aggregates will be explored into which the ‘statistical-counting-units’ are assembled. It is precisely through these aggregates that socio-economic data and the underlying phenomena can be interpreted.

Notes

1. See also: Winkler, Othmar W. “Statistical Flaws in Econometricians’ Perception of Economic Reality” Roy C. Brown ed., *Quantity and Quality of Economic Research*, Vol. I, University Press of America, Lanham, MD, 1985, pp. 295–354.
2. Kendall, M.G. and Buckland W.R. *A Dictionary of Statistical Terms*. Hafner Publishing Corp., New York, 1957. United Nations, General Principles for a Housing Census UN Statistical Papers Series M, No. 28, New York 1958. United Nations, Selección de una Unidad Estadística Adecuada para las Encuestas Económicas, UN Document E/CN.3/244, New York, 1957.
United Nations, *Statistics of Enterprises*, UN Doc. E/CN.3/169, and E/CN.3/169 Add.1, New York, 1954.
United Nations, *Statistics of Individual Industries*, UN Doc. E/CN.3/176, New York, 1954.
United Nations, *The Statistical Unit in Economic Inquiries*, UN Doc. E/CN.3/259.
3. This section follows: Winkler, O. W. “The Units (Elements) of Economic Statistics,” *Bulletin de L’ Institute International de Statistique*, Ottawa, August 1963, Vol. XL, Book 1, pp. 305–306.
4. Statisticians are not the only ones who have difficulty with what one would call socio-economic phenomena. In a (yet unpublished) paper “Issues Management: A New Direction for Public Relations Professionals” Professor Annette Shelby states: “T. Campbell has called identifying the issues the most neglected step in issues management. One of the major difficulties is the vast number of possible issues in . . . the internal and external environments. A further problem is the “mushiness” of the signals perceived which . . . may identify emerging trends. The ambiguity is so great that F.J. Connor, President and CEO of American Can Co. doubts that issues identification can be formalized. ‘Someone has to identify in the landscape of distinguished elements those that are significant, . . . He has to read meaning into what others, if they see the elements at all, simply dismiss. He has to see a new pattern emerging from an old. . .’

Despite reservations, organizations continue to search for a systematic approach to identifying issues. . . . S. Goodman provides a useful summary: 'monitoring published information, using company volunteers to identify and track issues, establishing issues committees as a part of the board of directors. . . .' Additionally, many organizations provide data from polling, content analysis, and general scanning. . . ." Annette Shelby, p. 8,9, paper presented at the Conference on Organizational Policy and Development, Louisville, April 1984. Although the expression "socio-economic phenomenon" is not mentioned in this paper, it gives an excellent description of such phenomena.

5. Gartner, William. B. "A Framework for Describing and Classifying the Phenomenon of New Venture Creation," *Academy of Management Review* 10 (4), 1985, pp. 696–706.
6. The reader very likely has encountered statements like the following without being aware that it was what here is called a socio-economic phenomenon. 'Unemployment in Morocco in 1984' would be such an example. "The IASS, jointly with the INSEE and the 'Direction de la Statistique Maroc', is organizing a seminar on the statistical approach of the non structured sector and its effects on . . . employment. . . in Rabat (Morocco). . . October 1984 to analyze the employment situation in a country, through household statistics alone. Those sources . . . allow a fair. . . knowledge of the active, employed and unemployed population. . . The main interest of these sources lies in grasping the whole of the phenomenon. . . and, to serve as a basis for the projections of planners. . . (p. 10). . . a systematic comparative analysis of the . . . information sources. . . is. . . allowing. . . a new light on the employment phenomenons, (sic) underemployment and unemployment. . . differences in concepts, definitions, observation methods and fields of inquiry make such comparisons difficult. . . the ways to apprehend those phenomenons can. . . be modified . . . and improved" (p. 11).

The Survey Statistician, JI. of the International Association of Survey Statisticians, ISI, June 11, 1984.

7. The critical observation by a clinical psychologist of the practice to transfer results from 'individual differences research' to the study of 'individual behavior' may further illustrate the need to clarify the phenomena to be studied while also showing the distinction between socio-economic phenomena and science phenomena. He states that: (. . . kind of knowledge that individual differences research can legitimately . . . yield is neither "idiographic" nor "nomothetic" in any sense that a personality theorist would be compelled to take seriously. . . (p. 143). . . The task is to make salient the errors of reasoning by which the empirical findings generated by individual differences research are made to seem interpretable at the level of the individual. . . these errors are. . . just different versions of. . . the psychologist's fallacy. According to (William) James. . . whenever the empirical properties of data are uncritically assumed to reflect psychological properties of the persons observations on whom occasioned. . . the analysis of those data. (pp. 143–145).

(Prior to a political election. . . pollsters. survey representative samples of the voting population in an attempt to forecast the outcome of the election. . . in one . . . poll it has been found that 51% of the sampled voters favor candidate A, while 49% favor candidate B. . . within the sample as a whole, there is a slight preference for candidate A, . . . no one would . . . interpret such findings as evidence that within each voting person there is (p. 144) a "mild preference" for candidate A over candidate B. Indeed, if this were the case, then an accurate poll would have revealed that candidate A was favored by 100% of the voters, and candidate B by no one. A 51–49% outcome might reflect any one of a very large number of underlying dynamics, one of which is that 51% of the sampled voters adamantly prefer candidate A while 49% just as adamantly prefer candidate B. . . then no one's preference is "mild". . . By the. . . same token,. . . a 99–1% outcome could be pointed to as evidence that there is an (overwhelming) preference for candidate A within the sample. . . such data would not constitute evidence that any voting person has an overwhelming preference one way or the other. . . it might just as well be true that each of 99% of the voters has but a mild preference for A, and each of 1% of the voters but a mild preference for B. . . no one in the sample could . . . be said to have an "overwhelming" preference at all. The point. . . is. . . whatever trends might be revealed by the. . . election poll. . . regarded as empirical trends that are. . . in the overall pattern

revealed by the votes. Whether or not there are any voting persons who have psychological inclinations corresponding to the identified trends is a matter on which the available data are altogether mute... election polls fail to ... inform us about voters... A pollster can ... ignore epistemological problems... because... What is central is not ... knowledge about the... voters, but knowledge about the pattern of the ... votes (145) ... The point is that if the central theoretical assertion of generic structuralism is valid, the empirical findings generated by individual differences research can not ... ever establish that fact. (155).

James T. Lamiell, *The Psychology of Personality – An Epistemological Inquiry*, Columbia University Press, New York, 1987.

This psychologist's concern, perhaps without being aware, illustrates the difference between a socio-economic and a science phenomenon. (This topic is further discussed in section 3.3 "The Interpretation of Aggregates.").

8. quoted in: Winkler, Wilhelm, op.cit. 1948, Vol. II, p. 304.
9. Weinhandl, Ferdinand, *Die Gestaltanalyse*, Verlag Kurt Stenger, Erfurt, 1927.
10. This section follows essentially Osgniach, Augustine J., OSB, *The Analysis of Objects*, J.F. Wagner, New York, 1938, and Brugger, S.J. Walter, *Philosophisches Wörterbuch*, sechste Auflage, Verlag Herder, Freiburg, 1957.
11. There are of course directly opposing views of this kind of 'reality'. Mysticism is essentially a belief that reality is oneness. ... mystics believe that our common perception of the universe as containing multitudes of discrete 'real-life-objects' ... trees, birds, horses, ourselves – all separated from one another by boundaries is a mis-perception, an illusion. To this ... mis-perception. ... that most of us mistakenly believe to be real, Hindus and Buddhists apply the word "Maya." They ... hold that true reality can be known only by experiencing the oneness through a giving up of ego boundaries. It is impossible to really see the unity of the universe as long as one continues to see oneself as a discrete object, separate and distinguishable from the rest of the universe.
M. Scott Peck, *The Road less Traveled* Simon & Schuster, N.Y. 1978, p. 96
12. Also see exhibit #1 in: Winkler, O. W. "A New Approach to Measuring Agricultural Production", *Proceedings of the Business and Economic Statistics Section of ASA*, Washington, D.C., 1963, p. 31
13. "The subjects which are most interesting in themselves do not lend themselves best to accurate observation and systematic study. But the two kinds of gradings can compensate for each other over a wide range of disciplines, in which they combine in variable proportions, and thus uphold throughout a steady level of scientific value. The supreme exactitude and scientific coherence of physics compensate for the comparative dullness of its inanimate subject matter, while the scientific value of biology is maintained at the same level as that of physics by the greater intrinsic interest of the living things studied, though the treatment is much less exact and coherent. ... science must accept to an important extent the pre-scientific conception of these subject matters. The existence of animals was not discovered by zoologists, nor that of plants by botanists, and the scientific value of zoology and botany is but an extension of man's pre-scientific interest in animals and plants. Psychologists must know from ordinary experience what human intelligence is, before they can devise tests for measuring it scientifically. ... If the scientific virtues of exact observation and strict correlation of data are given absolute preference for the treatment of a subject matter which disintegrates when represented in such terms, the result will be irrelevant to the subject matter and probably of no interest at all (p. 139) It ... requires ... hat we should explain all kinds of experience in terms of atomic data. This is of course the program of a mechanistic world view ... conjured up by Laplace's imagination has diverted attention from the decisive sleight of hand by which he substitutes a knowledge of all experience for a knowledge of all atomic data. Once you refuse this deceptive substitution, you see that the Laplacean mind understands precisely nothing and that whatever it knows means precisely nothing. Yet the spell of Laplacean delusion remains unbroken to this day. The ideal of strictly objective knowledge, paradigmatically formulated by Laplace, continues to sustain a universal tendency to enhance the observational accuracy and systematic precision of science, at the expense of its bearing on its subject matter. ... Scientific stringency,

inflexibly resolved to denature the vital facts of our existence, continues to sustain this conflict, which may yet issue in a sweeping reaction against science as a perversion of truth. ...a complex historical movement has since then led, along a number of mutually related lines, to the establishment in our time of the scientific method as the supreme interpreter of human affairs. (p. 141).

The thing to realize is that a knowledge of physics and chemistry would in itself not enable us to recognize a machine. Suppose you are faced with a problematic real-life-object and try to explore its nature by a meticulous physical or chemical analysis of all its parts (added observation: obviously this is done in a precise, quantitative manner). You may thus obtain a complete physico-chemical map of it. At what point would you discover that it is a machine. . . and. . . how it operates? Never. . .you cannot even put this question, let alone answer it, though you have all physics and chemistry at your finger-tips, unless you already know how machines work. . .The physico-chemical topography of the real-life-object may in some cases serve as a clue to its technical interpretation, but by itself it would leave us completely in the dark in this respect. The complete knowledge of a machine as a 'real-life-object tells us nothing about it as a machine. (p. 330). . .the observation of the. . . real-life-object in terms of physics and chemistry will spell complete ignorance of what it is. . .the more detailed knowledge we acquire of such a thing, the more our attention is distracted from seeing what it is. . .Some physical and chemical characteristics of a machine, such as its weight, size and shape, or its fragility,. . .will be of interest in themselves on certain occasions, for example to a carter undertaking the transport of the machine. But this is about as much as the scientific study of a machine can achieve when pursued in itself, without reference to the principles by which the machine performs its purpose (p. 331) Physical and chemical knowledge can form part of biology only in its bearing on previously established biological shapes and functions: a complete physical and chemical topography of a frog would tell us nothing about it as a frog, unless we knew it previously as a frog. . .(p. 342) This is true in respect of inanimate things like . . . machines. But its major importance emerges only when we turn to living beings, where an important additional feature is added to it: . . .our recognition of individuals." (p. 343). Polanyi, Michael, *Personal Knowledge – Towards a Post-Critical Philosophy*, The University of Chicago Press, Chicago, 1958.

14. The following excerpt from the weekly *Newsletter DH+S REVIEW* published by Deloitte Haskins + Sells, of August 18, 1986 unexpectedly confirmed my contention: "Boards of directors of the largest U.S. companies favor a stronger link between pay and performance. This finding comes from a survey conducted by Sibson & Company, Inc., which includes responses from 120 board members and 80 senior human resources executives of the 345 largest U.S. companies. The survey found that 60% of all directors responding thought that "more effectively relating pay to performance" is the most important issue facing large companies. **Qualitative aspects of performance were deemed by directors to be more important than quantitative measures:**" (highlighting added for emphasis). Directors Responses to Selected Measures of Evaluating CEO Performance Relative importance Assigned by

Directors			
Quantitative measures	%	Qualitative measures	%
EPS over 2–5 years	61	Establishing strategic direction.....	89
.....			
Return to shareholders.....	57	Building management team.....	80
Return on inv. Capita.....	37	Leadership qualities.....	73
Return on stockholders' equity.....	35	Providing for succession.....	71
Return measure trends.....	33	Implementing strategy.....	57

15. Winkler, Wilhelm, op.cit. Vol. I, p. 25.
16. Kellerer, Hans, *Übertragung einiger in der Bevölkerungswissenschaft gebräuchlichen Begriffe und Methoden auf das Wirtschaftsleben*, Muenchen 1951, p. 5.



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