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(OECD)**

**CLASSIFICATION SYSTEMS IN AGRICULTURE STATISTICS PROGRAMS:  
NEEDS AND CHANGING PRIORITIES\***

Invited paper submitted by Statistics Canada

1. This paper examines the needs of agriculture statistics programs and how well standard statistical classifications respond to them. While product and activity classifications have traditionally been most prominent, certain emerging needs of agriculture statistics programs may be better served through the development and adoption of new standard classifications.
2. A quick perusal of the published output of NSOs and international organizations in the field of agriculture statistics is sufficient to establish that the provision of various indicators by type of product is still the predominant requirement of agriculture statistics programs. Whether the indicator is production, imports, exports, supply, disposition, intentions, etc., it is always classified by type of agricultural and/or food product. To stay relevant in this regard, classification systems must therefore include specific classes for all significant products of this nature.

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3. There are a variety of classifications used to classify type of product in agriculture statistics, with more or less explicit linkages between them. The FAO commodity codes are used for the collection and publication of international agriculture statistics. The linkages between it and the HS (Harmonized system) and SITC (Standard International Trade Classification) are documented. Separately, and with no linkages other than through the HS, from which it was constructed, the CPC (Central Product Classification) also covers the universe of agriculture and food products, but with different details and a different structure.

4. It is a given that data on international trade of agriculture and food products will continue to be available through administrative sources in HS format. Finally, there are regional coding systems (for example, CPA in the EU) and national coding systems, with or without explicit linkages to the international classifications described above.

5. The issue then of creating explicit classes for items that have become empirically and analytically relevant would need to be addressed in at least three international classifications, the FAO commodity codes, the HS and the CPC. Practitioners in the field of agriculture statistics would know best which items need to be added in this way and the consultation effort being launched on the revision of the CPC is an opportunity to provide this input.

6. One might additionally question whether there would be any advantages to establishing more explicit linkages between the FAO commodity codes and the CPC. For example, the FAO structure could be considered a special aggregation of the CPC, using CPC classes from different parts of the classification (agriculture products and food manufacturing products) as building blocks. In this case, it may be necessary to make adjustments to the CPC detailed classes to fit into the FAO structure.

7. In addition to adding detailed classes and aligning structures, certain emerging public policy issues could signal a need for adapting the relevant product classifications. One such issue is the use of genetically modified organisms in agriculture.

8. The use of genetically modified organisms raises a multitude of concerns and possibilities for consumers and producers alike. Governments, researchers and other data users have an expressed need for tracking the extent to which GMOs are used in agricultural production. One way to address this issue is by adding GMO product codes alongside their non-GMO counterparts in product classifications. Producers are required for the most part to keep this information in their records, and could therefore supply it for statistical purposes. In addition, consumers will likely exert increasing pressure to maintain this distinction throughout the supply chain, so that manufacturers and distributors would also be required to keep this information.

9. At this time, is there a sufficient, long-term need for these data to introduce a GMO/non-GMO distinction in the relevant product classifications or should the issue be studied through customized survey information?

### The activity dimension

10 In agriculture statistics, the activity dimension seems to be the lesser used of the two basic economic classifications, products and activities. Only in the compilation of economic accounts for agriculture, as a special aggregate or as part of the national system of national accounts, is there much reference to activity classification. It is used for the classification of institutional units in the case of sector accounts and for the classification of establishments (or agricultural holdings) in the case of supply and use accounts.

11 There is only one international standard activity classification of concern, the ISIC (International Standard Industrial Classification). Regional classifications include NACE in the EU, which is ISIC based, and NAICS in North America, which is not. Note that the major theme of the revision to these classifications in 2007 is convergence. It is expected that ISIC, NACE and NAICS will be much more structurally and definitionally aligned after this revision. There are also numerous national activity classifications, some of which are based on ISIC.

12 Even though these are activity classifications, they are for the most part product-based. In other words, industries are usually defined in these classifications as the activity of growing or raising a particular type of agricultural commodity. As a result, inasmuch as detailed classes may be added to the product classifications described above, parallel activity classes may need to be added to ISIC. In ISIC, however, there is very limited detail at the present time in the divisions dealing with agriculture, forestry and fishing. There is a frequent recurring request for creating additional detail at the 4-digit level, corresponding to more detailed commodities.

13 A difficulty associated with defining industries according to product is how to treat units that produce a mix of products. Mixed farming can be defined as an activity class but the criteria for assigning units to such a class can be very complicated and difficult to apply and lead to unwanted results. For example, in NAICS, units that are engaged in agricultural activities are assigned to crop production or animal production if more than 50% of their agricultural production belongs to one or the other. In this way, a unit is always classified to one or the other. Once assigned to crop or animal production, units are assigned to a specific crop or animal production category, again if 50% of their agricultural production belongs to that specific category. For example, a unit will be classified to Wheat Farming (NAICS 11114) if 50%+ of its agricultural production is wheat, regardless of the composition of the rest of its production. If no one crop accounts for 50% of its agricultural production, the unit is classified to a "mixed crop" category. A parallel treatment exists in Animal Production. In ISIC, there is no concept of mixed crop or mixed animal farming. Once assigned to crop farming, units are coded to one of three crop farming classes according to its principal crop, and in the case of animal farming to one of two animal production classes, again according to the dominant one. But there is a class for the combination of crop and animal farming. Units are classified to crop farming only if 66% of their production consists of crops and likewise for animal farming. All other units are classified to mixed farming. This class therefore contains all units whose crop versus animal split varies between 35%-65% and 65%-35%.

14 These two very different treatments of mixed activities lead of course to different results. The example given above, classified to Wheat Farming in NAICS, would be classified to Mixed Farming in ISIC if the other 49% of its production were animal production. On the other hand, a unit that produces 40% wheat, 35% vegetables and 25% animals would be classified to Mixed crops in NAICS but to Cereal crops in ISIC. Small changes in these numbers can move units all over the place.

15 With the 2007 revisions at hand, the basis for this different treatment of agriculture in both classifications should be questioned and re-examined. Fundamentally, both approaches are meant to guarantee a certain minimum level of specialization for the units to be classified to a given, "unmixed" class. What are the advantages of this special treatment for agriculture? If there is an advantage, why should the same approach not be taken in both NAICS and ISIC for establishing the nature and minimum threshold of specialization?

16. An activity classification, however, need not be limited to class definitions that are product-based. ISIC itself recognizes that industries can be defined by products, inputs and/or processes. The production process principle was adopted in the development of the North American Industry Classification System (NAICS) and it guided the definition of classes at all levels of the classification. Industry classifications used in North America previous to NAICS, and most industry classifications currently in use around the world, tend to group production units according to what is produced, giving little or no importance to how it is produced. The measure of a well-defined class in such systems is the coverage ratio, that is, the share of the total output of a given product in the economy accounted for by the industry class so defined. In a production process approach, this measure is secondary to the specialization ratio, which measures the homogeneity of classes in terms of their production process.

17. Such an approach might be useful to address another current issue in agriculture statistics, that of organic farming. In many jurisdictions, agriculture using organic methods is moving from the fringe to the mainstream. Some countries have adopted specific targets for increasing the share of organic agriculture in overall agricultural production. Consumer concerns for security of food supply and environmental consciousness are factors in the rising popularity of organically grown products. To track the evolution of organic agriculture, an industry classification based on production process would be a valuable instrument.

18. Although we speak of organic products, these are often indistinguishable from "non-organic" products. The real difference lies in the production process. The hallmarks of organic farming are its methods, such as natural pest control, crop-diversification and use of manure and compost as fertilizers. This may represent a sufficiently different production process (capital, labour, energy, materials and services) as to define a different industry within agriculture. At this time, is there a sufficient, long-term need for these data to introduce an organic farming distinction in the standard classification?

19. A production process view is also relevant in the treatment of aquaculture in an activity classification. If product is the dominant factor in defining activity classes, then aquaculture should be grouped with fishing, as it is now in ISIC. If production process is given precedence, then aquaculture should be grouped with agriculture, as it is in NAICS,

where it is grouped with Animal production. An interesting question is whether growing crops under water (for example, algae) should be grouped with crop production, a treatment analogous to the placement of aquaculture with Animal production or whether all underwater agricultural activity should be grouped together on its own. Perhaps growing crops or raising animals under water are more similar in production process than either activity is with their respective land-based equivalents.

20. In a production process perspective, one might question as well whether distinctions should be made between different scales and methods of agriculture. Should small, hand-tended holdings be classified in the same class as immense, intensively mechanized operations? This would make sense if the only point of interest were the total production of a given commodity but from the point of view of productivity analysis, industry structure and many other issues in the field of agriculture today a supply-side approach may provide useful additional information. Simple processes for growing crops and raising animals, which have changed little since Neolithic times, persist today in various parts of the world. Other processes that harness natural power sources to supplement human effort, such as wind, water and draught animals, represent a different form of agriculture. The use of mechanized equipment, powered by internal combustion engines, fundamentally alters the capital-labour ratio and the economics of agriculture. Much smaller social groups can as a result efficiently handle much larger holdings. Perhaps, we are witnessing yet another transformation in the production process of agriculture, with intensive large-scale mechanization emerging as the predominant form. From a classification perspective, these different production processes in agriculture could represent four basic groupings, which could be labeled elemental agriculture, traditional agriculture, mechanized agriculture and intensively mechanized agriculture. Is there any value at this point in introducing these distinctions in the activity classification?

21. In terms of classification structure, agriculture figures as part of a grouping that combines it with hunting and forestry in ISIC, while in NAICS fishing is also included. These activities have in common the harvesting of bio-products. For environmental analysis, this is a relevant grouping. For other analytical uses, however, this grouping does not seem particularly useful. Often, for socio-economic analyses, agriculture is broken out as a stand-alone aggregate. In other cases, the agri-food complex or sector is the main focus of analysis. In this respect, it might be useful to publish, as part of ISIC, an agreed upon special aggregation for agri-food, which would list the ISIC industries that are considered part of this sector. In version 3.1 of ISIC, a similar special aggregation is published in an appendix for the Information and Communications Technology industries, as defined by the OECD. The FAO could provide a similar forum for international agreement on agri-food, which could then be published as an appendix in the next version of ISIC.

22. The life science economy, which may be updated terminology for the set of economic activities that is also referred to as the biotechnology sector, is an even broader industrial complex. In addition to food products, agricultural products can also be used to produce bio-fuels such as ethanol, or methane from biomass. Agriculture is also a source for nutraceuticals, bio-pharmaceuticals, building materials, plastics and paper. The life science economy is based on the use of knowledge of living things to create new bio-based products. Although statistical agencies have been called upon to define this sector as a special

aggregation, the creation of a special aggregation for such a broad and generally defined set of activities has proven problematic. Often, relevant manufacturing and distribution classes have not been defined along organic and inorganic lines. There is also a large research and professional services component in scope of this special aggregation, which also have often not been defined in terms of life sciences versus other sciences. At this point, there may not be sufficient consensus on the nature and boundaries of the life science economy to create a special aggregation of ISIC to represent it.

#### Other dimensions

23. There are many issues of analytical and public policy interest in the field of agriculture that cannot be addressed in the context of product and activity classifications. These classifications have been designed for a certain kind of economic analysis, in the analytical framework of national accounting. The analysis of questions regarding technology use, including the use of biotechnologies, would benefit from the development and adoption of standard classifications of technologies. The study of research and development activities in the field of agriculture would similarly benefit from the development and use of classifications of fields of science. The production of data on the whole complex of issues surrounding agriculture and the environment requires the development of conceptual frameworks and associated classifications well beyond the scope and coverage of our traditional classifications. The processes and bodies that currently exist for the maintenance and improvement of these traditional classifications are not suitable for the development of appropriate classifications for new areas of interest in the field of agriculture statistics. Devising effective processes and mechanisms for this purpose is a challenge for the FAO and the international community of agriculture statisticians.

## ANNEX 1

### Excerpt from the ISIC and CPC Concepts Paper for 2007 Revision: Agriculture

#### 1.1 III.1 Section 1 - Agriculture, Hunting, Forestry and Fishing

This section combines previous tabulation categories A and B. This takes into account the common primary function of the two tabulation categories, namely the taking of living things from nature, and also recognizes the limited use of the coding system in the past (Fishing remained just one category at the top three levels of the classification – or even at all levels in ISIC Rev.3).

This would cover the activities of growing crops, raising animals, exploiting fishery resources, harvesting timber, and harvesting other plants and animals from a farm or their natural habitats. Service activities related to the activities are included in this section and grouped with the activities that they support.

However, a general question as to whether “Services incidental to” or support services to agriculture should be placed with the relevant category or separately still has not been resolved.

Possible division structure:

- 1 Agriculture, Hunting, Forestry and Fishing
- 1.1 Agriculture and related service activities
- 1.2 Forestry, logging and related service activities
- 1.3 Hunting, trapping and related services
- 1.4 Fishing and related services
- 1.5 Aquaculture

Divisions:

#### **1.1 Agriculture and related service activities**

##### **Content:**

This division covers the managed exploitation of vegetal and animal natural resources. This includes two basic activities: the production of crop products and the managed production of animal products (except fishing). Also included are agricultural support services (services incidental to agriculture).

Exploitation of animal natural resources through hunting is excluded (see 1.3), landscaping is excluded (see 14.7).

The breakdowns in this division should consider the requests for more detail in this area.

At the present time, no consensus has emerged concerning the definition of “organic”. It is therefore not feasible to include organic farming as a category within ISIC.

**Relevance:**

The importance of the agricultural sector, in terms of value added in the whole economy, may be decreasing in many countries. However, it still covers the predominant portion of the primary sector.

**Comparability:**

This category corresponds to NAICS subsectors 111 (Crop Production), 112 (Animal Production), and NAICS industry groups 1151 (Support Activities for Crop Production) and 1152 (Support Activities for Animal Production).

However, a major difference between ISIC and NAICS is the fact that NAICS subsector 115 (Support Activities for Agriculture and Forestry) is located outside of the main activities, while in ISIC “related services activities” are part of the main activity.

**Continuity:**

Hunting has been moved to a new separate category at the division level, breaking it out from the old agriculture division. Therefore, this division corresponds to ISIC Rev.3.1 groups 011, 012, 013 and 014. Landscaping is excluded from former group 014. Growing of mushrooms stays in this division while gathering of mushrooms is transferred to division 1.2 (Forestry)

**Boundary questions:**

Clear separation of agriculture and forestry is necessary (e.g. for short-rotation trees – Christmas trees).

Beneficiating activities (e.g. cotton ginning) need to be clarified – should they be treated as manufacturing when not done in connection with farming?

Integrated activities (e.g. grape growing and wine production, olive growing and olive oil production) need to be clarified. Currently in ISIC, the case of wine is in agriculture, the case of olives is in manufacturing. The proposal is to classify all integrated activities that originate in agriculture to agriculture. This would also apply to integrated activities of raising chicken and production of chicken meat etc.

Classification of irrigation for agricultural purposes (agricultural service or business service or water supply) may depend on the actual activity carried out, i.e. the term “irrigation” may be too broad.

## **1.2 Forestry, logging and related service activities**

### **Content:**

This division covers the production of standing timber as well as the extraction and gathering of wild growing forest materials (with exceptions, see below). It also includes the production of timber, forestry results in products that undergo little processing, such as wood for fuel or industrial use (e.g. pit-props, pulpwood, etc.).

### **Relevance:**

This division identifies the exploitation of vegetal natural resources, usually with long life cycles, and unmanaged exploitation of vegetal natural resources.

### **Comparability:**

This category corresponds to NAICS subsector 113 (Forestry and Logging) and NAICS industrial group 1153 (Support Activities for Forestry). This division includes the extraction and gathering of truffles, berries, etc. It also includes the growing of Christmas trees, which NAICS includes in the crop production subsector.

### **Continuity:**

These activities correspond to ISIC 3.1 division 02. Gathering of mushrooms etc., which had been previously part of 1.1 (Agriculture), is included in this division.

### **Boundary questions:**

Clear separation of agriculture and forestry is necessary (e.g. for short-rotation trees – Christmas trees).

## **1.3 Hunting, trapping and related activities**

### **Content:**

This division covers the exploitation of animal natural resources. Unlike division 1.1, these activities depend on a continued supply of natural resources. Management is restricted to conservation measures and habitat maintenance, but does not include the active regeneration of the resource as in 1.1.

### **Relevance:**

This division identifies the exploitation of (unmanaged) animal natural resources.

**Comparability:**

This category corresponds to NAICS industrial group 1142 (Hunting and trapping). Related service activities are included in this NAICS category as well.

While separately identifiable, this is at a lower level than in ISIC now.

**Continuity:**

These activities correspond to ISIC 3.1 group 015.

**Boundary questions:**

Hunting of marine mammals is included, except for whales. Distinction is according to usual location of hunting (land vs. sea).

#### **1.4 Fishing and related services**

**Content:**

This division includes the exploitation of fishery resources from marine or freshwater environments, covering the capturing or gathering of fish, crustaceans, mollusks and other marine products (e.g. pearls, sponges, etc.). These activities depend on a continued supply of natural resources and do not include the active regeneration of the resource as in 1.5. The activities of factory ships that also fish are included here. (This follows the intended treatment of integrated activities as described in 1.1.)

Aquaculture is excluded (see 1.5).

**Relevance:**

This division covers the (unmanaged) exploitation of fishery resources,

**Comparability:**

This category corresponds to NAICS industry group 1141 (Fishing). While separately identifiable, this is at a lower level than in ISIC now. See also boundary question below.

**Continuity:**

All these activities were considered under Section B in ISIC 3.1

**Boundary issues:**

Whale hunting is here, while hunting of other sea mammals is in 1.3 (see above) (NAICS includes seal hunting in Fishing). Gathering and processing of sea food in factory ships is considered under NAICS subsector 311 (Food manufacturing), while in ISIC it is included in Fishing for factory ships that also fish, and in Food manufacturing otherwise.

Fish stock management is in NAICS sector 54 (Professional, Scientific, and Technical Services), while in ISIC is included in this division (and was in division 05 (Fishing) of ISIC Rev.3.1).

## **1.5 Aquaculture**

### **Content:**

This division includes fish farming in sea and fresh water including farming of ornamental fish; cultivation of oysters, operation of fish hatcheries, and the service activities incidental to the operation of fish hatcheries and fish farms. This division also includes the production of oyster spat, mussel, lobsterlings, shrimp post-larvae, fish fry and fingerlings; the growing of laver and other edible seaweeds.

### **Relevance:**

Its identification at this level and separation from other fishing activities reflect the widely growing importance of this activity.

### **Comparability:**

It corresponds to NAICS industry group 1125 (Animal aquaculture), although ISIC also includes non-animal aquaculture such as the growing of laver and other edible seaweeds.

### **Continuity:**

This category has been moved from Fishing. It corresponds to ISIC 3.1 class 0502.

### **Boundary issues:**

None

## ANNEX 2

### Excerpts from the 2003 Questionnaire for the ISIC and CPC revision: Agriculture

#### Agricultural activities

The desire to make the classification categories for agricultural activities more relevant, has led to consideration of various concepts that are of use to analysts and also reflect growing trends in agriculture.

1. The issue of “**organic farming**” has been raised, but no clear guidance can be given at this point to address this issue in an industry context. While the focus is often on organic products, the differentiation is clearly process-related. However, labelling guidelines may be different between countries. While “genetic modification” is clearly a concept in agriculture, it is not clear how boundary issues can be resolved, as practically any breeding is a form of genetic manipulation. In addition how would inadvertent modification, e.g. through seeds introduced from other areas (e.g. through wind) be treated? More definitional guidance is necessary if such a concept should be introduced.
2. The “**mixed farming**” category in ISIC Rev.3 covers units without a strong specialization. The criterion given in the classification is less than 66% specialization in both crop and animal farming. There is not universal support for this activity. Additionally, in many countries there seems to be an implementation problem. An argument in the past was that this category also addresses the needs of small size farms with frequently shifting focus between those two branches of agriculture. The question has been raised a) if such a distinction is useful, b) if it violates classification concepts by creating potential overlaps with other categories, c) if a decision on principal activity should always be possible and, in case of frequent changes, should use the same methodology that would be used for manufacturing etc. and d) if this category is actually being used by countries. On the other hand, the issue has been raised as to whether additional forms of mixed farming should be recognized, such as, agriculture mixed with forestry or agriculture mixed with fishing. Country feedback on whether this category should be maintained and why it is necessary.
3. The placement of **aquaculture** under the division of Agriculture was initially proposed, based on the similarity of the activities involved. This would also enhance comparability with NAICS. This creates however problems in maintaining strong links with previous versions of the classification. To account for historical and current organization in this area, which still maintains close links between fishing and aquaculture (e.g. for fishery statistics), the identification of aquaculture as a separate activity, i.e. not included under agriculture or fishing was proposed and is reflected in the ISIC structure draft.

4. General support services that are not specific to any particular industry have been combined in two sections of the ISIC draft (13 and 14 – accounting for differences in character of those services). The remaining “specific” support services or “services incidental to” should be placed closer to the industry/activity that they serve. The question is whether for these services a separate service category should be created or whether these service activities should be placed / combined with the relevant detailed category of activities that they serve. If separate categories are necessary, at which level of the classification should they be introduced?
- This relates to support services in agriculture, mining, transportation, education and finance and insurance.

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