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ENGINEERING SERVICES AND THE CPC

Statistics Canada

INTRODUCTION

1. This paper comments on the statistical relevance and applicability of the CPC categories for engineering services on the basis of Statistics Canada's experience in the collection of commodity data for the Engineering Services Industry¹ and of consultations with the industry. It also presents a few key statistics on the Canadian industry's output in terms of the CPC.

THE COLLECTION OF COMMODITY DATA FOR THE ENGINEERING SERVICES INDUSTRY AND THE RELATIONSHIP TO THE CPC

2. The collection of revenue data, by type of engineering service, was introduced in the 1986 Survey of Consulting Engineers and has been repeated annually thereafter. The most recent observations are for the 1989 reference year. The preliminary results from the 1989 survey for the responding firms form the basis of the observations contained in this report. More than 400 firms have responded to the survey.

3. A wide range of information has been collected through the survey including data relating to operating expenses (project and administrative), the occupation of the firm's employees and the value of exports. However this report concentrates on analysing the breakdown of revenues, as this is the information of interest in assessing the relevance of the CPC for engineering services.

4. The survey collects commodity "type" data by asking for separate estimates (% of total fees) of fees earned by **type of service rendered** and by **field of specialization** in which services are offered². These two classification frameworks have been modified over time in order to:

- a) accommodate the needs of data users;
- b) adjust to respondent feedback, and;
- c) bring our classification system more in line with the CPC.

5. The field of specialization classification is a classification of the types of projects in which engineering firms are engaged. The collection of these data were introduced in response to the interest shown by users in the kind of expertise in the industry, and

¹ Canadian SIC 7752 - Offices of Engineers which corresponds to the engineering services segment of ISIC 7421 - Architectural and engineering and related technical consultancy.

² See annex 1 for a detailed list of the categories used in the 1989 survey.

therefore, the kind of expertise it can potentially export. In response to this demand, the questionnaire collects data (fees) for 13 fields of specialization³.

6. The CPC (86721 to 86739) is a classification by type of service; it therefore relates to the "type of service" classification used in the survey. The main differences between the CPC and the survey's classification are:

- a) The survey classification does not break down design services by type (CPC 86722 - 26);
- b) The survey classification does not include a category equivalent to CPC 86727 - Other engineering services during the construction and installation phase (except in reference year 1986).
- c) The survey classification includes a category for the service "project management", a category that has not been delineated in the CPC.

These differences are discussed further in the next section⁴.

7. Although the survey has not collected data for all of the engineering CPC subclasses, the information it has provided, when supplemented with information obtained through consultations with the industry (in particular the consultations conducted for the pricing project), allows us to draw some conclusions with respect to the CPC's applicability and relevance. The next section examines each CPC (in the order in which it appears in the classification) and related issues.

ENGINEERING SERVICES CPC

8. The chart below shows the relative importance⁵ of the different types of engineering services produced in Canada. Where applicable, the engineering CPC category (or categories) to which the survey categories relate is (are) also shown.

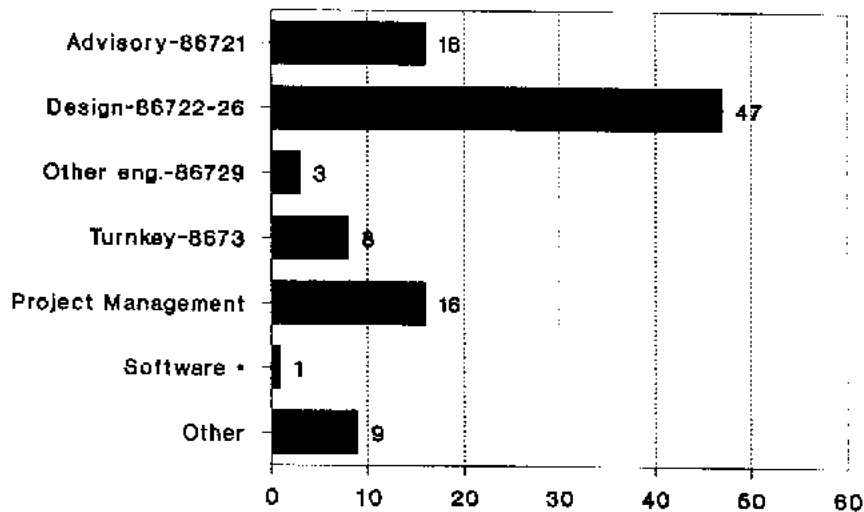
³ See annex 1.

⁴ See annex 2 for a detailed comparison of the two classifications.

⁵ Expressed as a % of the total fees earned for services rendered. The total fees do not include reimbursable expenses, sub-consultant fees, and non-operating revenues.

Fees by Type of Service

% of total fees



* The software category may include revenues from the production of packaged and custom software (Computer model survey categories 841 - **Packaged software products** and 8423 - **Custom software development services**) and from the sale of software produced by others (part of CPC 62284 -**Wholesale trade services of office machinery and equipment**).

9. The provision of **Advisory and consultative engineering services** (CPC 86721) accounts for a significant portion (16%) of the surveyed population's revenues. More than half of the respondents reported revenues in this category and it represents the major source of revenues for 55 of them. There has been no particular difficulty in collecting data for this category.

10. **Engineering design services** (CPCs 86722 to 86726) have been the industry's most important source of fees from 1986 to 1989 (47% of total fees in 1989). In 1989, 3 out of 4 firms surveyed have reported providing this service and more than half of the respondents have declared it to be their primary source of revenues. Ten percent of the surveyed firms provide only this service.

11. The statistical significance of the design service category tends to legitimize the approach adopted in the CPC of distinguishing design service categories. Our pricing survey shows that the information exists. Whether respondents should be requested to breakdown services by type of project, depends on the extent to which firms specialise in providing a particular type of design service and on further analysis of the relative price movements of design services by type.

12. Data for **CPC 86727 - Other engineering services during the construction and installation phase** - has only been collected for the 1986 reference year. This service accounted for 14.4% of the industry's revenues. At the time, however, there were doubts as to the validity of this result; it was believed that some of these revenues should have been reported under the category project management. As a result of this uncertainty, the category was dropped in the following year and has not been reintroduced into the survey.

13. It has since been found, through consultations with engineering firms, that both services are provided by the industry. CPC 86727 is generally known as "construction management" and the CPC explanatory notes adequately describe this service. The service of "project management", which is not listed in the CPC, is quite different in nature (see paragraphs 17 to 19 for more detail).

14. The provision of **Other (specialized) engineering services** (CPC 86729) accounts for a relatively small proportion (3% in 1989) of the industry's revenues in 1989, although a significant number of firms (185) reported providing such services. This result suggests that the classification used, provides an adequate coverage of the main types of engineering services.

15. The provision of **Integrated engineering services for turnkey projects** (CPC 8673) represented approximately 8% of the industry's total output in 1989, a slight increase over the three previous year average of 7%. This service is the most "specialized" of the engineering services; only 74 firms surveyed reported providing turnkey service, and it was the primary source of revenues for 31 of these 74 firms. We have found that the 5 digit break down of this category suggested for the CPC, which classifies turnkey services by broad type of project⁶, is not meaningful. Indications are that turnkey services typically relate to "industrial projects". It is likely, therefore, that these 5 digit categories in the CPC are not required.

16. Respondents to the survey were also asked to provide an estimate of the fees earned from the provision of **project management** services. The service of **project management** is not explicitly recognized in the CPC. Rather, it is defined as an integral

⁶ **86731** - Integrated engineering services for transportation infrastructure projects, **86732** - Integrated engineering and project management services for water supply and sanitation works projects, **86733** - Integrated engineering services for the construction of manufacturing projects, **86739** - Integrated engineering services for other projects.

component of any of the following categories⁷: **CPC 8671** - Architectural services, **CPC 8672** - Engineering services or **CPC 8673** - Integrated engineering services. The approach simply allowed for the fact that this type of service is offered by both engineering and architectural firms. In fact it is provided by firms in other industries as well, for example, management consulting.

17. The survey results and consultations with engineering consulting firms indicate that **project management services** are recognized in the industry as a distinct service and are an important and growing source of revenue. In 1989, this service represented 16% of the surveyed population's output, second only to design services⁸. Approximately half of the surveyed firms reported offering this service, in the majority of cases as a secondary activity.

18. A project management contract consists of managing a project on behalf of the owner/client. This typically includes planning and scheduling, providing cost estimates for various phases of the project, issuing and analysing tenders, awarding contracts (architecture, engineering, construction), controlling the flow of documents, controlling costs, accounting, reviewing and monitoring construction and may also include procurement of material and equipment⁹. The service can be charged for on a fee for service basis or as a percentage of the cost of the project.

19. The other categories for which data have been collected, **software** and **other**, account for 1% and 9% of total fees respectively. Only 39 firms have reported software revenues. The residual revenues reported (136 firms) probably include a fair amount of revenues for technical services, in particular those related to testing on construction sites (part of CPCs 86762, 764 and 769) and procurement. This assumption, however, needs verification.

⁷ See the explanatory notes for **CPC 86601** - Project management services other than for construction.

⁸ The absence of a "construction management" category may have led to an overstatement of the relative importance of this service.

⁹ Some firms price procurement and project management separately when they are asked to provide both services as part of a single contract. Others consider procurement a sub-component of project management.

CONCLUSION

20. The Canadian experience suggests that, except for the two categories mentioned below, the CPC appropriately classifies engineering services and should therefore stand.

21. The detailed **integrated engineering service** categories are not very useful in the Canadian setting and likely will not be in other countries. The notion of "turnkey" projects seems to apply mainly to industrial projects. If this finding is confirmed by other countries, the definition of this category should emphasize this aspect.

22. The other apparent shortcoming of the CPC is the absence of an explicit category for project management services. As mentioned earlier, our experience has shown that engineering firms offer such services and keep records about them and that the industry recognizes it as an important service; it has also shown that these services are an important and growing source of revenues.

23. It remains unclear, however, whether engineering firms are the only type of business providing these services or if they are the primary producer of these services; if such was the case, project management services related to construction could be deemed a type of engineering service. The introduction of a project management category in the CPC and its testing by a number of countries would help clarify these unresolved issues.

24. It is suggested that CPC 867 - Architectural, engineering and other technical services could be restructured to introduce more homogeneity at the three digit level, allow for development of the classification at its more detailed level and introduce a "project management" category. Tentatively, this structure could be as follows¹⁰:

867 - Architectural services

8671 - Advisory and pre-design architectural services

8672 - Architectural design services

8673 - Contract administration services

8674 - Combined architectural design and contract administration services

8679 - Other architectural services

¹⁰ The shaded area indicate significant changes to the current CPC.

868 - Engineering services

8681 - Advisory and consultative engineering services

8682 - Engineering design services

86821 - Engineering design services for the construction of foundations and building structures

86822 - Engineering design services for mechanical and electrical installations for buildings

86823 - Engineering design services for the construction of civil engineering works

86824 - Engineering design services for industrial processes and production

86829 - Engineering design services n.e.c.

8683 - Engineering services during the construction and installation phase

8684 - Integrated (turnkey) engineering services

8689 - Other engineering services

869 - Services related to engineering and architecture

8691 - Project management services (related to construction)

8692 - Urban planning services

8693 - Landscape architecture services

8694 - Prospecting, surveying and related services

86941 - Geological, geophysical and other prospecting services

86942 - Subsurface surveying services

86943 - Surface surveying services

86944 - Map making services

8695 - Technical testing and analysis services

86951 - Composition and purity testing and analysis services

86952 - Testing and analysis services of physical properties

86953 - Testing and analysis services of integrated mechanical and electrical systems

86954 - Technical inspection services

86959 - Other technical testing and analysis services

ANNEX 1

CLASSIFICATIONS USED IN THE 1989 SURVEY OF CONSULTING ENGINEERS

| <u>REVENUE BY TYPE OF SERVICE</u> ¹ | <u>% OF TOTAL FEES</u> ² |
|---|-------------------------------------|
| a) Turnkey Projects | 8 % |
| b) Advisory Services - Environmental | 4 % |
| c) Advisory Services - Other | 12 % |
| d) Design Services - Environmental | 8 % |
| e) Design Services - Other | 39 % |
| f) Project Management Services | 16 % |
| g) Supplementary Services | 3 % |
| h) Sale of Software Products or Custom Systems Development | 1 % |
| i) Other | 9 % |

| <u>REVENUE BY FIELD OF SPECIALIZATION</u> | <u>% OF TOTAL FEES</u> |
|--|------------------------|
| a) Buildings (structural) | 8.0 % |
| b) Buildings (mechanical\electrical) | 10.5 % |
| c) Highways, Bridges, Tunnels, Railways | 6.0 % |
| d) Transportation Facilities | 4.5 % |
| e) Municipal (roads, streets water supply | 11.0 % |
| f) Municipal (sewage treatment, waste disposal) | 6.5 % |
| g) Other Environmental Services | 6.0 % |
| h) Mining, Metallurgy, Primary Metal | 9.0 % |
| i) Pulp and Paper | 6.5 % |
| j) Oil, Petroleum and Natural Gas | 8.0 % |
| k) Power Generation and Transmission | 6.5 % |
| l) Other Industrial | 5.5 % |
| m) Other | 12.0 % |

¹ It is probable that the distinction between environmental related and non-environmental advisory and design services made in the 1989 survey will not be used in the next survey due to the definitional and practical difficulties encountered in the collection of this data.

² Based on preliminary estimates of the total fees earned for services rendered. The total fees do not include reimbursable expenses, sub-consultant fees, and non-operating revenues.

ANNEX 2

CONCORDANCE BETWEEN THE SURVEY'S TYPE OF SERVICE CLASSIFICATION AND THE CPC

SURVEY

Turnkey projects

Advisory services - Environmental
Advisory services - Other

Design services - Environmental
Design services - Other

Project management services

Supplementary services

CPC

8673 - Integrated engineering services

86721 - Advisory and consultative engineering services

86722 - Engineering design services for the construction of foundations and building structures

86723 - Engineering design services for mechanical and electrical installation for buildings

86724 - Engineering design services for the construction of civil engineering works

86725 - Engineering design services for industrial process and production

86726 - Engineering design services n.e.c.

Integral part of CPCs 8671, 72 and 73

86729 - Other engineering services

CPC CATEGORIES

86721 - Advisory and consultative engineering services

86722 - Engineering design services for the construction of foundations and building structures

86723 - Engineering design services for mechanical and electrical installation for buildings

86724 - Engineering design services for the construction of civil engineering works

86725 - Engineering design services for industrial process and production

86726 - Engineering design services n.e.c.

86729 - Other engineering services

8673 - Integrated engineering services

not explicitly delineated

SURVEY CATEGORIES

Advisory services - environmental
Advisory services - other

Design services - environmental
Design services - other

Supplementary services

Turnkey projects

Project management