OECD OCDE

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY

STAN INDICATORS (2005 edition)

1980-2003

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I. INTRODUCTION

STAN Indicators are calculated from output, labour input, investment and trade data taken from the November 2005 version of STAN Database for Industrial Analysis[1] (STAN) and also use R&D data taken from the 2004 edition of the Analytical Business Enterprise R&D Database[2] (ANBERD); they complement the 2005 edition of the OECD publication *Science, Industry and Technology - Scoreboard of Indicators*[3].

STAN Indicators consist of about 30 measures related to international trade, industrial composition, business enterprise Research & Development, employment, productivity and investment (gross fixed). They highlight trends in industrial structure and performance for OECD countries and various country groups.

For further information regarding science, technology and industry statistics, please visit our web page http://www.oecd.org/sti/.

Any suggestions for including new indicators in this data set are welcomed.

The recommended citation for use of these data is **OECD, STAN Indicators 2005**.

[1] www.oecd.org/sti/stan/
[2] www.oecd.org/sti/anberd/
[3] www.oecd.org/sti/scoreboard/

II. GENERAL NOTES

1. Groups of indicators

STAN indicators are presented in *five* groups according to the following main themes: international trade, industrial composition, business enterprise research & development; employment and productivity; and investment (s*ee* section III. for further details).

2. Data coverage

Most of indicators are provided for all OECD countries; however, for some countries and some indicators the detailed industry and/or time coverage can be very weak. Indicators are also given for selected country groups such as EU, G7, NAFTA, OECD, etc. The composition of these groups varies according to the indicators in order to optimise the industry and period coverage (s*ee* section IV. for further details). Series cover the time period 1980-2002/2003 and are presented for the manufacturing and services sectors as well as for additional industry groups based on technology intensity (*see* section V. for further details).

3. Data dissemination

STAN Indicators are released on a CD-ROM together with other STAN family data sets and a PDF version of the OECD STI Scoreboard 2005. Further information regarding this CD-ROM is available at the OECD online bookshop. STAN Indicators are also available on *OlisNet*, the OECD secure extranet for Government Officials, in Excel tables and are disseminated on line via *SourceOECD*, OECD's commercial online service, using the query based tool Beyond 20/20. The Beyond 20/20 version is supplied with the *Beyond 20/20*™ browser (version 6.2) under licence from *Ivation Datasystems Inc*. This is a Windows-based data dissemination tool that allows viewing, printing, graphing and exporting selected data in a user-friendly manner.

4. Notation

The following notation is used in the presentation of the definitions of indicators:

Variables

ANBERD	business enterprise R&D *at current prices*
PROD	production *at current prices*
VALU	value added *at current prices*
EMPN	number engaged (total employment)
LABR	labour compensation *at current prices*
EXPO	total exports *at current prices*
IMPO	total imports *at current prices*
VALUK	value added *volumes*
GFCF	gross fixed capital formation *at current prices*

Qualifiers and indices

i	ISIC Rev.3 activity sector
total	total of all activity sectors
total manuf.	total of manufacturing sectors
k	country or country group
OECD	total of all OECD countries (varies according to indicator)

Definitions of the underlying variables can be found in the **documentation file** of STAN Database for Strutural Analysis.

Remarks on calculations for country groups:

- The underlying data (i.e. production, exports and imports), used for trade indicators, were first converted to US dollars using the *exchange rates.*

- The underlying data (i.e. production, business enterprise R&D, value added, gross fixed capital formation and labour compensation), used for the indicators of industrial composition, research and development, employment and productivity, and investment were first converted to US dollars using the *purchasing power parities for total GDP* (PPPs).

- The *exchange rates* and *purchasing power parities* are extracted from OECD's System of National Accounts database (SNA). They are used for converting the countries' raw data before aggregation to the country groups.

III. LIST OF INDICATORS

This section details the calculation of each indicator and provides some explanations regarding their interpretation, and potential limits.

INTERNATIONAL TRADE

These indicators address the question of trade specialisation and performance in international markets.

Note: Country groupings include intra-group trade (for example, the EU group does not exclude intra-EU trade). Up to and including 1990, the data for Germany refer to western Germany (Federal Republic of Germany, including West Berlin). From 1991, data for Germany include Eastern Germany.

a) Indicators based on Exports and Imports only

1. Intra-industry trade (IIT)
2. Contribution to manufacturing trade balance (CMTB)
3. Export / Import ratio (XM)
4. Export shares relative to OECD23 (XMSO23)
5. Import propensity relative to OECD23 & the total economy (MSPEC23)
6. Import propensity relative to OECD23 & total manufacturing (MSPEC23M)
7. Export specialisation relative to OECD23 & the total economy (XSPEC23)
8. Export specialisation relative to OECD23 & total manufacturing (XSPEC23M)
9. Composition of total exports of goods (XSH)
10. Composition of manufacturing exports of goods (XSHMAN)
11. Composition of total imports of goods (MSH)
12. Composition of manufacturing imports of goods (MSHMAN)

1. Intra-industry trade (IIT)

Intra-industry trade is the value of total trade remaining after subtraction of the absolute value of net exports or imports of an industry. For comparison between countries and industries, the measures are expressed as a percentage of each industry's combined exports and imports. For total manufacturing, the calculation is the summation of the value of total trade remaining after subtraction of the absolute value of net exports or imports for all manufacturing industries.

This index varies between zero and 100. If a country exports and imports roughly equal quantities of a certain product, the IIT index is high. If trade is mainly one-way (whether exporting or importing), the IIT index is low.

For individual industries:

$$IIT_i^k = \left[1 - \frac{\left| \left(EXPO_i^k - IMPO_i^k \right) \right|}{\left(EXPO_i^k + IMPO_i^k \right)} \right] x\,100$$

For total manufacturing:

$$IIT_{\text{total manuf.}}^k = \left[1 - \frac{\sum_i \left| \left(EXPO_i^k - IMPO_i^k \right) \right|}{\sum_i \left(EXPO_i^k + IMPO_i^k \right)} \right] x\,100$$

IIT is *not* calculated for country groups.

2. Contribution to manufacturing trade balance (CMTB)

The "contribution to the trade balance" makes it possible to identify an economy's structural strengths and weaknesses *via* the composition of international trade flows. It takes into account not only exports, but also imports, and tries to eliminate business cycle variations by comparing an industry's trade balance with the overall trade balance. It can be interpreted as an indicator of "revealed comparative advantage", as it indicates whether an industry performs relatively better or worse than the manufacturing total, no matter whether the manufacturing total itself is in deficit or surplus.

If there were no comparative advantage or disadvantage for any industry *i*, a country's total trade balance (surplus or deficit) should be distributed across industries according to their share in total trade. The "contribution to the manufacturing trade balance" is the difference between the actual and this theoretical balance:

$$CMTB_i^k = \left[\left(EXPO_i^k - IMPO_i^k \right) - \left(EXPO_{manuf}^k - IMPO_{manuf}^k \right) \frac{\left| \left(EXPO_i^k + IMPO_i^k \right) \right|}{\left(EXPO_{manuf}^k + IMPO_{manuf}^k \right)} \right] x\,100$$

A positive value for an industry indicates a structural surplus and a negative one a structural deficit. The indicator is additive and individual industries can be grouped together by summing their respective values: by construction, the sum over all industries is zero. To allow comparisons across countries, the indicator is generally expressed as a percentage of total trade or of GDP.

3. Export / Import ratio *(XM)*

This indicator shows exports as a percentage of imports.

$$XM_i^k = \frac{EXPO_i^k}{IMPO_i^k} \times 100$$

4. Export shares relative to OECD23 *(XMSO23)*

This indicator shows exports of a certain industry for a given country (or country group) as a percentage of exports of this industry for 23 selected OECD countries (*see* country groups' definitions, in section IV).

$$XMSO23_i^k = \frac{EXPO_i^k}{EXPO_i^{OECD23}} \times 100$$

5. Import propensity relative to OECD23 and the total economy *(MSPEC23)*

This indicator shows a country's (or country group's) imports for an industry relative to total industries' imports, divided by OECD23 imports of the same industry relative to OECD23 total industries' imports.

For a given country, a value above 100 in a certain industry implies that, relative to the OECD23 average, the country tends to have a high propensity to import in that given industry.

$$MSPEC23_i^k = \frac{\left(\frac{IMPO_i^k}{IMPO_{total}^k}\right)}{\left(\frac{IMPO_i^{OECD23}}{IMPO_{total}^{OECD23}}\right)} \times 100$$

6. Import propensity relative to OECD23 and total manufacturing *(MSPEC23M)*

This indicator shows a country's (or country group's) imports for an industry relative to total manufacturing imports, divided by OECD23 imports of the same industry relative to OECD23 total manufacturing imports.

For a given country, a value above 100 in a certain industry implies that, relative to the OECD23 average, the country tends to have a high propensity to import in that given industry.

$$\text{MSPEC23M}_i^k = \frac{\left(\frac{\text{IMPO}_i^k}{\text{IMPO}_{\text{total manuf.}}^k}\right)}{\left(\frac{\text{IMPO}_i^{\text{OECD23}}}{\text{IMPO}_{\text{total manuf.}}^{\text{OECD23}}}\right)} \text{x}\,100$$

7. Export specialisation relative to OECD23 and the total economy *(XSPEC23)*

This indicator shows a country's (or country group's) exports for an industry relative to total industries' exports, divided by OECD23 exports of the same industry relative to OECD23 total industries' exports.

For a given country, a value of 100 implies that the country exports equal proportions of goods than the OECD23 average. A value above 100 in a certain industry implies that, relative to the OECD23 average, the country tends to specialise in exports in that given industry. This indicator is quite versatile but for each country, it allows to draw and compare its overall profile relative to the OECD area; it is also commonly known as the *index of revealed comparative advantage*.

$$\text{XSPEC23}_i^k = \frac{\left(\frac{\text{EXPO}_i^k}{\text{EXPO}_{\text{total}}^k}\right)}{\left(\frac{\text{EXPO}_i^{\text{OECD23}}}{\text{EXPO}_{\text{total}}^{\text{OECD23}}}\right)} \text{x}\,100 = \frac{\text{XSH}_i^k}{\text{XSH}_i^{\text{OECD23}}}$$

8. Export specialisation relative to OECD23 and total manufacturing *(XSPEC23M)*

This indicator shows a country's (or country group's) exports for an industry relative to total manufacturing exports, divided by OECD23 exports of the same industry relative to OECD23 total manufacturing exports.

$$\text{XSPEC23M}_i^k = \frac{\left(\frac{\text{EXPO}_i^k}{\text{EXPO}_{\text{total manuf.}}^k}\right)}{\left(\frac{\text{EXPO}_i^{\text{OECD23}}}{\text{EXPO}_{\text{total manuf.}}^{\text{OECD23}}}\right)} \text{x } 100 = \frac{\text{XSHMAN}_i^k}{\text{XSHMAN}_i^{\text{OECD23}}}$$

9. Composition of total exports of goods *(XSH)*

This indicator shows the exports in a given industry as a percentage of total industries' exports.

$$\text{XSH}_i^k = \frac{\text{EXPO}_i^k}{\text{EXPO}_{\text{total goods}}^k} \text{x } 100$$

10. Composition of manufacturing exports of goods *(XSHMAN)*

This indicator shows the exports in a given manufacturing industry as a percentage of total manufacturing exports.

$$\text{XSHMAN}_i^k = \frac{\text{EXPO}_i^k}{\text{EXPO}_{\text{total manuf.}}^k} \text{x } 100$$

11. Composition of total imports of goods *(MSH)*

This indicator shows the imports of a given industry as a percentage of the total sectors' imports.

$$\text{MSH}_i^k = \frac{\text{IMPO}_i^k}{\text{IMPO}_{\text{total goods}}^k} \text{x } 100$$

12. Composition of manufacturing imports of goods *(MSHMAN)*

This indicator shows the imports of a given manufacturing industry as the percentage of the total manufacturing imports of goods.

$$\text{MSHMAN}_i^k = \frac{\text{IMPO}_i^k}{\text{IMPO}_{\text{total manuf.}}^k} \text{x } 100$$

b) Indicators based on Exports, Imports and Production

13. Export share of production (XPROD)

14. Import penetration (MPEN)

13. Export share of production (XPROD)

This indicator shows exports as a percentage of production.

The export share of production shows the importance of the foreign market for a given industry in a country. This indicator may change over time as supply and demand conditions change in foreign and domestic markets.

$$XPROD_i^k = \frac{EXPO_i^k}{PROD_i^k} \times 100$$

14. Import penetration (MPEN)

This indicator shows imports as a percentage of total domestic demand (this latter is estimated as production *plus* imports *less* exports).

For a given country (country group), a value close to 100 in a certain industry, implies that domestic demand is mainly fulfilled by imports and domestic production tends to be exported; whereas a value above 100 illustrates measurement problems when combining production and trade (exports can exceed production, *see* note below). A value close to zero means self sufficient, i.e. domestic demand is mainly satisfied by domestic production.

$$MPEN_i^k = \frac{IMPO_i^k}{\left(PROD_i^k + IMPO_i^k - EXPO_i^k\right)} \times 100$$

Note: When interpreting those two indicators, it is important to bear in mind that exports can exceed production. This can occur for the following reasons:

(i) exports include re-exports (this particularly concerns countries such as Belgium and the Netherlands where there is a significant amount of 'transit trade') ;

(ii) production data are normally based on Industrial Surveys which record establishments' *primary activities*. Therefore, activities that are mainly secondary may be understated in terms of production by not being allocated to the relevant ISIC code while exports of the related commodities are allocated to that ISIC code;

(iii) bias introduced by the conversion from product-based trade statistics to activity-based industry statistics for certain sectors for certain countries.

INDUSTRIAL COMPOSITION

These indicators attempt to reveal the importance of each industry in the economies of OECD countries.

Note: The valuation of value added differs among countries and may therefore influence the interpretation of these indicators - value added is measured *at basic prices* for all countries except Japan and the United States that use producer's or market prices.

15. Value added shares relative to the total economy (VASH)
16. Value added shares relative to total manufacturing (VASHMAN)
17. Value added shares of manufacturing industries relative to OECD18 (VASHOM)

15. Value added shares relative to the total economy *(VASH)*

This indicator shows each industry's value added as a percentage of value added for the total economy.

$$VASH_i^k = \left[\frac{VALU_i^k}{VALU_{total}^k} \right] x\,100$$

16. Value added shares relative to total manufacturing *(VASHMAN)*

This indicator shows the value added contributed by each manufacturing sector to total manufacturing.

$$VASHMAN_i^k = \left[\frac{VALU_i^k}{VALU_{total\ manuf.}^k} \right] x\,100$$

17. Value added shares of manufacturing industries relative to OECD18 *(VASHOM)*

This indicator shows, for a given manufacturing industry, each country's value added as a percentage of value added for 18 selected OECD countries (*see* country groups' definitions, in section IV.).

$$VASHOM_i^k = \left[\frac{VALU_i^k}{VALU_{OECD18}^k} \right] x\,100$$

BUSINESS ENTERPRISE R&D

These indicators highlight the efforts undertaken by the OECD countries in the field of business enterprise expenditures in research and development; these measures also show the distribution of R&D expenditures within and across OECD countries, as well as R&D intensity.

18. Distribution of R&D expenditures across industries for the total economy (RDS)
19. Distribution of R&D expenditures across industries for total manufacturing (RDSMAN)
20. R&D expenditures shares across OECD12 (RDSO12)
21. R&D intensity using value added (RDIV)
22. R&D intensity using production (RDIP)

18. Distribution of R&D expenditures across industries for the total economy *(RDS)*

This indicator shows the R&D expenditures for an industry as a percentage of R&D expenditures for the total economy.

$$RDS_i^k = \frac{ANBERD_i^k}{ANBERD_{total}^k} \times 100$$

19. Distribution of R&D expenditures across industries for total manufacturing *(RDSMAN)*

This indicator shows the R&D expenditures for an industry as a percentage of R&D expenditures for total manufacturing.

$$RDSMAN_i^k = \frac{ANBERD_i^k}{ANBERD_{total\ manuf.}^k} \times 100$$

20. R&D expenditures shares across OECD12 *(RDSO12)*

This indicator represents the R&D expenditures for a given country relative to the R&D expenditures for 12 selected OECD countries (*see* country groups' definitions, in section IV).

$$RDSO12_i^k = \frac{ANBERD_i^k}{ANBERD_i^{OECD\_RD2}} \times 100$$

R&D intensities have been calculated in *two ways*. The first expresses R&D expenditures as a percentage of value added while the second expressed R&D expenditures as a percentage of production.

These two indicators cannot be calculated for most country groups and are not available for recent years due to the coverage of R&D data by country.

21. R&D intensity using value added *(RDIV)*

$$RDIV_i^k = \frac{ANBERD_i^k}{VALU_i^k} \times 100$$

22. R&D intensity using production *(RDIP)*

$$RDIP_i^k = \frac{ANBERD_i^k}{PROD_i^k} \times 100$$

EMPLOYMENT AND PRODUCTIVITY

Indicators in this area address the issue of employment structure and compensation, labour costs and labour productivity.

Note: For some countries when coverage for total employment data was weak, other employment measures were used for calculations (eg: *number of employees* for the Czech Republic, Mexico, the United Kingdom and *number of jobs full-time equivalent* for Switzerland); therefore comparisons across countries should be undertaken with caution. For country groups, all calculations are based on the *number of persons engaged* (i.e. total employment).

23. Employment shares in the total economy (EMPSH)
24. Employment shares in total manufacturing (EMPSHM)
25. Labour compensation per employee for the total economy (LABEMP)
26. Labour compensation per employee for total manufacturing (LABEMPM)
27. Labour share of value added (LABVAL)
28. Labour productivity (LPDTY)
29. Unit labour cost (ULC)

23. Employment shares in the total economy (EMPSH)

This indicator shows each industry's employment as a percentage of employment for the total economy.

$$EMPSH^{k}_{i} = \frac{EMPN^{k}_{i}}{EMPN^{k}_{total}} \times 100$$

24. Employment shares in total manufacturing (EMPSHM)

This indicator shows each industry's employment as a percentage of employment for total manufacturing.

$$EMPSHM^{k}_{i} = \frac{EMPN^{k}_{i}}{EMPN^{k}_{total\ manuf.}} \times 100$$

25. Labour compensation per employee relative to the total economy *(LABEMP)*

This indicator is calculated as the ratio of labour compensation for a particular industry (or industry group) to the number engaged divided by the ratio of labour compensation for the total economy to the number of persons engaged for the total economy.

$$\mathrm{LABEMP}_i^k = \frac{\left(\frac{\mathrm{LABR}_i^k}{\mathrm{EMPN}_i^k}\right)}{\left(\frac{\mathrm{LABR}_{total}^k}{\mathrm{EMPN}_{total}^k}\right)} \mathrm{x}\,100$$

26. Labour compensation per employee relative to total manufacturing *(LABEMPM)*

This indicator is calculated as the ratio of labour compensation for a particular manufacturing industry (or industry group) to the number engaged divided by the ratio of labour compensation for total manufacturing to the number of persons engaged for total manufacturing.

$$\mathrm{LABEMPM}_i^k = \frac{\left(\frac{\mathrm{LABR}_i^k}{\mathrm{EMPN}_i^k}\right)}{\left(\frac{\mathrm{LABR}_{total\ manuf.}^k}{\mathrm{EMPN}_{total\ manuf.}^k}\right)} \mathrm{x}\,100$$

27. Labour share of value added *(LABVAL)*

This indicator shows labour compensation in a certain industry as a percentage of value added in that industry.

$$\mathrm{LABVAL}_i^k = \frac{\mathrm{LABR}_i^k}{\mathrm{VALU}_i^k} \mathrm{x}\,100$$

Note: Labour costs can exceed value added when an industry incurs losses or when an industry receives significant net subsidies (value added measured at producer's prices does not include subsidies). However, the occurrence of values exceeding 100 may also be due to measurement biases when certain series are estimates.

28. Labour productivity *(LPDTY)*

This indicator is the ratio of value added volumes to number engaged. Although hours worked would be preferable as a measure of labour input, at the present time consistent hours worked data are not available in STAN Database for all OECD countries at the industry level. Labour productivity represents the amount of output per unit of input, output being here defined as value added.

$$\mathrm{LPDTY}_i^k = \frac{\mathrm{VALUK}_i^k}{\mathrm{EMPN}_i^k}$$

Note: The series are presented as indices. Most of countries use either 1995 or 2000 as reference years, while Canada and Iceland use 1997 and Mexico uses 1993. This indicator is *not* calculated for country groups.

29. Unit labour cost *(ULC)*

This indicator is the ratio of labour compensation at current prices to output as measured by value added volumes. It represents the current cost of labour to produce one unit of output and reflects how labour costs increase / decrease relative to output; it is an indicator of costs competitiveness.

$$\mathrm{ULC}_i^k = \frac{\mathrm{LABR}_i^k}{\mathrm{VALUK}_i^k}$$

Note:

Labour costs can exceed value added in certain cases; for example, when heavy losses are incurred within an industry or, more generally, when an industry's gross operating surplus is negative and/or it receives significant subsidies.

The series are presented as indices. Most of countries use either 1995 or 2000 as reference years, while Canada and Iceland use 1997 and Mexico uses 1993. This indicator is *not* calculated for country groups.

INVESTMENT

Indicators in this area address the issue of the industrial distribution of investment efforts and the investment intensity in value added.

30. Investment shares in the total economy (INVSH)
31. Investment shares in total manufacturing (INVSHM)
32. Investment intensity based on value added (INVIV)

30. Investment shares in the total economy *(INVSH)*

This indicator represents the investment composition of the total economy. It is calculated by dividing each industry's gross fixed capital formation by gross fixed capital formation for total industries.

$$INVSH\ {}^{k}_{i} = \frac{GFCF\ {}^{k}_{i}}{GFCF^{k}_{\text{total economy}}} \text{ x } 100$$

31. Investment shares in total manufacturing *(INVSHM)*

This indicator represents the investment composition of manufacturing. It is calculated by dividing each manufacturing industry's gross fixed capital formation by gross fixed capital formation for total manufacturing.

$$INVSHM\ {}^{k}_{i} = \frac{GFCF\ {}^{k}_{i}}{GFCF^{k}_{\text{total manuf.}}} \text{ x } 100$$

32. Investment intensity *(INVIV)*

This indicator is calculated as the ratio of gross fixed capital formation in a certain industry to value added in that industry.

$$INVIV\ {}^{k}_{i} = \frac{GFCF\ {}^{k}_{i}}{VALU^{k}_{i}} \text{ x } 100$$

IV. COUNTRY GROUPS

STAN indicators are presented for a list of *country groups*; a selection of the main groups is presented below. Country groups vary across indicators and represent the sum of OECD countries for which industrial and / or time period coverage for data is good, while providing a maximum of details.

EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

EU14: EU15 excluding Luxembourg.

EU17: EU14 including Czech Republic, Hungary, Poland.

EU18: EU17 including Slovak Republic.

EU19 or (OECD_EU)**:** EU countries that are also members of OECD.

EU_RD: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, United Kingdom.

EU_RD9: EU_RD excluding Belgium, Netherlands.

NAFTA: Canada, Mexico, United States.

G7: Canada, France, Germany, Italy, Japan, United Kingdom, United States.

OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, New Zealand, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

OECD29: OECD excluding Luxembourg.

OECD28: OECD excluding Luxembourg, Slovak Republic.

OECD26: OECD excluding Czech Republic, Korea, Luxembourg, Slovak Republic.

OECD23: OECD excluding Czech Republic, Hungary, Korea, Luxembourg, Mexico, Poland, Slovak Republic.

OECD15: Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Norway, Portugal, Spain, Sweden, United Kingdom, United States.

OECD_RD: EU_RD including Australia, Canada, Czech Republic, Japan, Korea, Norway, Poland, United States.

OECD_RD2: EU_RD9 including Canada, Japan, United States.

V. INDUSTRY COVERAGE

In STAN indicators, the industry list is based upon *ISIC revision 3* and covers 65 sectors; detailed information by sector varies across countries and across indicators.

Description	*ISIC Rev.3 division*
GRAND TOTAL	**01-99**
AGRICULTURE, HUNTING, FORESTRY AND FISHING	**01-05**
MINING AND QUARRYING	**10-14**
TOTAL MANUFACTURING	**15-37**
Food products, beverages and tobacco	15-16
Textiles, textile products, leather and footwear	17-19
Wood, pulp, paper, paper products, printing and publishing	20-22
Wood and products of wood and cork	20
Pulp, paper, paper products, printing and publishing	21-22
Chemical, rubber, plastics and fuel products	23-25
….Coke, refined petroleum products and nuclear fuel	23
….Chemicals and chemical products	24
……Chemicals excluding pharmaceuticals	24 *less* 2423
……Pharmaceuticals	2423
….Rubber and plastic products	25
Other non-metallic mineral products	26
Basic metals and fabricated metal products	27-28
….Basic metals	27
……Iron and steel	271+2731
……Non-ferrous metals	272+2732
….Fabricated metal products, except machinery and equipment	28
Machinery and equipment	29-33
…. Machinery and equipment, n.e.c.	29
…. Electrical and optical equipment	30-33
……Office, accounting and computing machinery	30
……Electrical machinery and apparatus, n.e.c.	31
……Radio, television and communication equipment	32
……Medical, precision and optical instruments	33
Transport equipment	34-35
….Motor vehicles, trailers and semi-trailers	34
….Other transport equipment	35
……Building and repairing of ships and boats	351
……Aircraft and spacecraft	353
……Railroad equipment and transport equipment, n.e.c.	352+359
Manufacturing, n.e.c; recycling	36+37

INDUSTRY COVERAGE (*continued*)

Description	*ISIC Rev.3 division*
ELECTRICITY, GAS AND WATER	**40-41**
CONSTRUCTION	**45**
WHOLESALE AND RETAIL TRADE; RESTAURANTS AND HOTELS	**50-55**
Wholesale and retail trade; repairs	50-52
Hotels and restaurants	55
TRANSPORT AND STORAGE; COMMUNICATION	**60-64**
Transport and storage	60-63
Post and telecommunications	64
FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES	**65-74**
Financial intermediation	65-67
Real estate, renting and business activities	70-74
….Real estate activities	70
….Renting and other business activities	71-74
……Other business activities	74
COMMUNITY, SOCIAL AND PERSONAL SERVICES	**75-99**
Public administration and defence; compulsory social security	75
Education	80
Health and social work	85
Other community, social and personal services	90-93
Private households with employed persons	95
NON-AGRICULTURE BUSINESS SECTOR (*excl. "Real estate activities", ISIC70*)	**10-74**
TOTAL SERVICES	**50-99**
BUSINESS SECTOR SERVICES	**50-74**
Additional groups	
HIGH TECHNOLOGY MANUFACTURES	**2423, 30, 32, 33, 353**
MEDIUM-HIGH TECHNOLOGY MANUFACTURES	**29, 31, 34, 24 less 2423, 352+359**
MEDIUM-LOW TECHNOLOGY MANUFACTURES	**23, 25, 26, 351, 27-28**
LOW TECHNOLOGY MANUFACTURES	**15-16, 17-19, 20, 21-22, 36-37**
HIGH-MEDIUM HIGH TECHNOLOGY MANUFACTURES [1]	**24, 29-33, 35**
ICT MANUFACTURES	**30, 32, 33** [2]
ENERGY PRODUCING ACTIVITIES	**10-12, 23, 40**

[1] Including shipbuilding, which allows for wide coverage for many countries.
[2] This does not correspond to the official OECD list of ICT manufactures; see the OECD publication Measuring information economy for more details.

CLASSIFICATION OF MANUFACTURING INDUSTRIES BASED ON TECHNOLOGY

The following notes appear in the Annex 1of the 2003 edition of the OECD Science, Technology and Industry Scoreboard.

Technological effort is a critical determinant of productivity growth and international competitiveness. However, since it is not spread evenly across the economy, analyses of industry performance and structural change attach much importance to technological criteria. Methodological work carried out at the OECD is used to determine these criteria.

In the past, a technology classification based on ISIC Rev. 2 industry classifications was widely used. The methodology uses three indicators of technology intensity reflecting, to different degrees, "technology-producer" and "technology-user" aspects: *i)* R&D expenditures divided by value added; *ii)* R&D expenditures divided by production; and *iii)* R&D expenditures plus technology embodied in intermediate and investment goods divided by production. These indicators were evaluated for 1990 and for the aggregate of the ten OECD countries for which a measure of embodied technology was available, using 1990 USD purchasing power parities (see T. Hatzichronoglou, "Revision of the High-Technology Sector and Product Classification", STI Working Paper 1997/2).

Following the adoption of ISIC Rev. 3 (NACE Rev. 1 in Europe) for collecting and presenting data on industrial activity both in national accounts (in the context of SNA93/ESA95) and industrial surveys, the 2001 Scoreboard used ISIC Rev. 3 R&D expenditure and output data to develop an updated technology classification based on an evaluation of R&D intensities for 13 OECD countries for the period 1991-97. In the absence of updated ISIC Rev. 3 input-output tables (required for estimating embodied technology), only the first two indicators could be calculated. This edition extends the analysis to cover the period 1991-1999, although for only 12 OECD countries.

The division of manufacturing industries into high-technology, medium-high-technology, medium-low-technology and low-technology groups was made after ranking the industries according to their average over 1991-1999 against aggregate OECD R&D intensities. Industries classified to higher categories have a higher average intensity for both indicators than industries in lower categories. Also considered were: *i)* temporal stability: for adjacent years, industries classified to higher categories have a higher average intensity than those in lower categories (see Annex Table 1.2); and *ii)* country median stability: industries classified to the higher categories have a higher median intensity than those in lower categories.

Points to note:

- This classification confirms that of the 2001 *Scoreboard* and also confirms the classification of "Medical, precision and optical instruments" (ISIC Rev. 3, Division 33) as a high-technology industry. This sector's R&D intensity continues to rise, and its inclusion complements the definition of the ICT sector (see *Measuring the Information Economy*, OECD, 2002) which includes some of its sub-divisions (notably 3312 and 3313).

- The cut-off points are clear except possibly the distinction between the medium-low- and low-technology groups.

- The low-technology group consists of relatively aggregate sectors, owing to limited detailed R&D expenditure data across countries. The few cases in which R&D intensities are available for more detailed (2-digit) breakdowns confirm the allocation of these industries to low technology.

- The classification concerns the OECD area as a whole. For individual countries, allocation to the technology groups may differ. Also, at national level, finer technology classifications may be generated from more detailed underlying data.

Annex 1.1. **Classification of manufacturing industries based on technology**[1]

	ISIC Rev. 3	1999				1991			
		R&D divided by production		R&D divided by value added		R&D divided by production		R&D divided by value added	
		Aggregate intensity[2]	Median intensity	Aggregate intensity[2]	Median intensity	Aggregate intensity[2]	Median intensity	Aggregate intensity[2]	Median intensity
High-technology industries									
Aircraft and spacecraft	353	10.3	10.4	29.1	27.5	13.9	12.9	34.7	32.1
Pharmaceuticals	2423	10.5	10.1	22.3	25.8	9.4	8.7	20.6	19.7
Office, accounting and computing machinery	30	7.2	4.6	25.8	15.1	10.9	6.4	29.4	15.2
Radio, TV and communciations equipment	32	7.4	7.6	17.9	22.4	7.9	8.2	17.0	21.5
Medical, precision and optical instruments	33	9.7	5.6	24.6	11.9	6.6	6.1	15.6	12.5
Medium-high-technology industries									
Electrical machinery and apparatus, n.e.c.	31	3.6	2.3	9.1	6.7	4.2	2.6	9.3	5.9
Motor vehicles, trailers and semi-trailers	34	3.5	2.8	13.3	11.7	3.7	3.0	14.3	11.9
Chemicals excluding pharmaceuticals	24 excl. 2423	2.9	2.2	8.3	7.1	3.4	2.8	9.8	8.0
Railroad equipment and transport equipment, n.e.c.	352 + 359	3.1	2.8	8.7	7.9	2.9	2.1	7.6	5.4
Machinery and equipment, n.e.c.	29	2.2	2.1	5.8	5.3	1.9	2.0	4.6	4.7
Medium-low-technology industries									
Building and repairing of ships and boats	351	1.0	1.0	3.1	2.9	0.9	0.9	2.8	2.6
Rubber and plastics products	25	1.0	1.1	2.7	3.0	1.0	0.6	2.6	1.5
Coke, refined petroleum products and nuclear fuel	23	0.4	0.3	1.9	2.7	1.2	0.7	5.4	3.8
Other non-metallic mineral products	26	0.8	0.6	1.9	1.3	1.0	0.6	2.4	1.5
Basic metals and fabricated metal products	27-28	0.6	0.5	1.6	1.4	0.7	0.6	2.0	1.6
Low-technology industries									
Manufacturing, n.e.c.; Recycling	36-37	0.5	0.5	1.3	1.2	0.5	0.4	1.2	0.9
Wood, pulp, paper, paper products, printing and publishing	20-22	0.4	0.1	1.0	0.3	0.3	0.1	0.8	0.3
Food products, beverages and tobacco	15-16	0.3	0.3	1.1	1.0	0.3	0.3	1.1	1.1
Textiles, textile products, leather and footwear	17-19	0.3	0.4	0.8	1.0	0.2	0.3	0.7	0.7
Total manufacturing	15-37	2.6	2.2	7.2	6.5	2.5	2.0	7.0	5.7

1. Based on data for 12 OECD countries: United States, Canada, Japan, Denmark, Finland, France, Germany, Ireland, Italy, Spain, Sweden, United Kingdom

2. Aggregate R&D intensities calculated after converting countries' R&D expenditures, value added and production using GDP PPPs

Source: OECD: ANBERD and STAN databases, May 2003

Annex 1.2. **R&D intensity[1] for aggregate of 12 OECD countries, 1991-1999**

	ISIC Rev.3	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	mean intensity 1991-1999
Aircraft and spacecraft	353	13.9	13.9	13.5	13.9	16.2	14.8	12.8	10.7	10.3	13.3
Pharmaceuticals	2423	9.4	10.1	10.8	10.9	10.6	10.3	11.0	11.1	10.5	10.5
Office, accounting and computing machinery	30	10.9	10.4	9.3	8.8	7.5	9.1	10.4	8.9	7.2	9.2
Radio, TV and communciations equipment	32	7.9	8.3	7.9	7.8	7.7	8.2	8.0	8.6	7.4	8.0
Medical, precision and optical instruments	33	6.6	6.8	7.1	7.7	7.7	7.4	8.0	8.0	9.7	7.7
Electrical machinery and apparatus, n.e.c.	31	4.2	4.0	4.0	3.8	4.0	3.9	3.9	4.0	3.6	3.9
Motor vehicles, trailers and semi-trailers	34	3.7	3.4	3.5	3.4	3.5	3.7	3.5	3.3	3.5	3.5
Chemicals excluding pharmaceuticals	24 excl. 24	3.4	3.3	3.4	3.1	2.8	3.1	2.7	3.1	2.9	3.1
Railroad equipment and transport equipment, n.e.c.	352 + 359	2.9	2.4	2.4	2.7	2.6	3.2	3.5	3.0	3.1	2.9
Machinery and equipment, n.e.c.	29	1.9	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.2	2.1
Building and repairing of ships and boats	351	0.9	1.0	1.0	0.9	0.9	1.0	0.8	1.0	1.0	1.0
Rubber and plastics products	25	1.0	1.0	0.9	1.0	0.8	0.9	0.9	0.9	1.0	0.9
Coke, refined petroleum products and nuclear fuel	23	1.2	1.2	1.1	1.0	0.9	0.8	0.7	0.9	0.4	0.9
Other non-metallic mineral products	26	1.0	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.8	0.9
Basic metals and fabricated metal products	27-28	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6
Manufacturing, n.e.c.; Recycling	36-37	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.6	0.5	0.5
Wood, pulp, paper, paper products, printing and publishing	20-22	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3
Food products, beverages and tobacco	15-16	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Textiles, textile products, leather and footwear	17-19	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total manufacturing	**15-37**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**	**2.6**	**2.6**	**2.6**	**2.6**	**2.5**
High-technology industries		**9.4**	**9.5**	**9.3**	**9.3**	**9.2**	**9.3**	**9.5**	**9.3**	**8.7**	**9.3**
Medium-high-technology industries		**3.1**	**3.0**	**3.1**	**3.0**	**2.9**	**3.1**	**2.9**	**3.0**	**3.0**	**3.0**
Medium-low-technology industries		**0.9**	**0.9**	**0.9**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.7**	**0.8**
Low-technology industries		**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.4**	**0.4**	**0.4**	**0.4**	**0.3**

1. R&D intensity defined as direct R&D expenditures as a percentage of production (gross output), calculated after converting countries' R&D expenditures and production using GDP PPPs

Source: OECD: ANBERD and STAN databases, May 2003