

ISO 9001 STANDARD MANAGEMENT SYSTEM CERTIFICATION – DATA ANALYSIS FOR SECTORS BY COUNTRY

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Abstract: The purpose of the paper is to analyse and demonstrate the trends in the scope of data concerning the number of ISO 9001 certificates incorporated in companies around the world with consideration of market division into 39 sectors. The study utilised the desk research method for analysing the available sources of data for the studied problem, especially covering their compilation, mutual verification, processing and reasoning. Then, multi-dimensional comparative analyses were conducted for the obtained results within a time framework of 1998-2017. As result of the conducted analyses, leading sectors in particular countries in terms of the number of incorporated ISO 9001 series standards were established. This enabled identifying the tendencies and determining the further directions of change. The paper is original in that it is based on analysing data within an industry framework in the period of nine years, identifying existing trends and establishing specific cases (countries and industries) for which the ISO 9001 standards are common and for which they are a niche.

Keywords: ISO 9001, certifications, sectors by country

1. INTRODUCTION

The ISO 9001 international standard has permanently taken root in enterprises all across the world (Heras-Saizarbitoria, 2011; Koc, 2007; Marin et al., 2011). It became an inseparable system element of many organisations and it seems that classifying it as a component of organisational culture has its rational justification (Kim et al., 2011; Briscoe et al., 2005). ISO 9001 constitutes a widely recognised quality management standard in terms of planning, organising, monitoring and control in the framework of continuous improvement (Allur et al., 2014; Franceschini et al., 2018). Regardless of the deficiencies of the normative approach to a company's quality management system, as of yet only the ISO 9001 standard was spread on a global scale (Rusjan et al., 2010, Sampaio et al., 2009). Naturally, the intensity of incorporating the ISO 9001 in companies across the world varies, because it depends on many external and internal factors (Sampaio et al., 2009, Terziowski et al., 2003). Nevertheless, an analysis of the statistics concerning the number of ISO 9001 incorporations in companies of a given

country allows for the observation of a dependency between the number and the given country's degree of economic growth, political and legal, technical and technological, social and cultural or international dimension (Hys, 2015, Dick et al., 2008).

2. METHODOLOGY OF RESEARCH

The purpose of the paper is to analyse and demonstrate the trends in the scope of data concerning the number of ISO 9001 certificates incorporated in companies around the world with consideration of market division into 39 sectors. The study was conducted using the desk research method. The data was organised according to an established selection key resulting from the adopted detailed objectives of this paper. The analysis covered over a dozen reports published by the International Organization for Standardization, an independent, non-governmental international organisation with a membership of 162 national standards bodies. Accredited bodies from nearly all countries in the world annually submit current statistical data on the number of ISO 9001 certificates obtained by companies in the given year. Thanks to a co-operation with these bodies, International Organization for Standardization keeps a regular list and thus monitoring of the changes in the scope of ISO 9001 incorporations. This paper will be focused on ISO 9001 incorporations, but from the perspective of industry sectors (Table 1). All sectors were classified in 39 groups, which results from the adopted European classification (EA stands for European Accreditation). The data analysis was conducted for the period between 1998 to 2017.

Table 1
EA stands for European Accreditation

EA CODE	EA DESCRIPTION, INDUSTRY	EA CODE	EA DESCRIPTION, INDUSTRY
1	Agriculture & Fishing	21	Aerospace
2	Mining & Quarrying	22	Other Transport Equipment
3	Food products, Beverages & Tobacco	23	Manufacturing (not elsewhere classified)
4	Textiles & Textile Products	24	Recycling
5	Leather & Leather Products	25	Electricity Supply
6	Wood & Wood Products	26	Gas Supply
7	Pulp, Paper & Paper Products	27	Water Supply
8	Publishing Companies	28	Construction
9	Printing Companies	29	Wholesale & Retail Trade; Repair of Motor Vehicles, Motorcycles
10	Manufacture of Coke & Refined Petroleum Products	30	Hotels & Restaurants
11	Nuclear Fuel	31	Transport, Storage & Communication
12	Chemicals, Chemical Products & Fibres	32	Financial Intermediation; Real Estate & Renting
13	Pharmaceuticals	33	Information Technology
14	Rubber & Plastic Products	34	Engineering Services
15	Non-Metallic Mineral Products	35	Other Services
16	Concrete, Cement, Lime, Plaster	36	Public Administration
17	Basic Metals & Fabricated Metal Products	37	Education
18	Machinery & Equipment	38	Health & Social Work

19	Electrical & Optical Equipment	39	Other Social Services
20	Shipbuilding		

The data analysis was conducted in the scope of detailed objectives conforming to the paper’s main objective, specifically:

P1: global data analysis in the scope of 162 countries, the accredited bodies of which are International Organization for Standardization members.

P2: data analysis concerning the number of ISO 9001 incorporations for particular sectors in European countries.

P3: data analysis concerning the number of global incorporations in particular years for sectors that are leading or incidentally take part in ISO 9001 incorporations.

3. RESULTS

The realisation of the detailed objectives allowed for analysing the statistical data in the scope of ISO 9001 incorporation intensity in the world, with specific consideration of industrial sectors. The data analysis was conducted in three stages: in the scope of global data; data concerning the ISO 9001 incorporations in 39 sectors in European countries and the analysis of leading and incidental sectors for these countries.

3.1. ISO 9001 by industrial sector in the world

The global data analysis period covered 20 years, starting in 1998. It is a period during which accredited certification bodies being ISO members submitted data on the incorporation numbers as part of co-operation. The number of ISO 9001 incorporations for 39 industry sectors for the given period constitutes impressive analytical material. The breakdown of data in a global framework (the data concerns all countries submitting data to the ISO) allows for the following interpretation. A general breakdown, due to the data’s multiplicity, is rather indecipherable (Fig. 1).

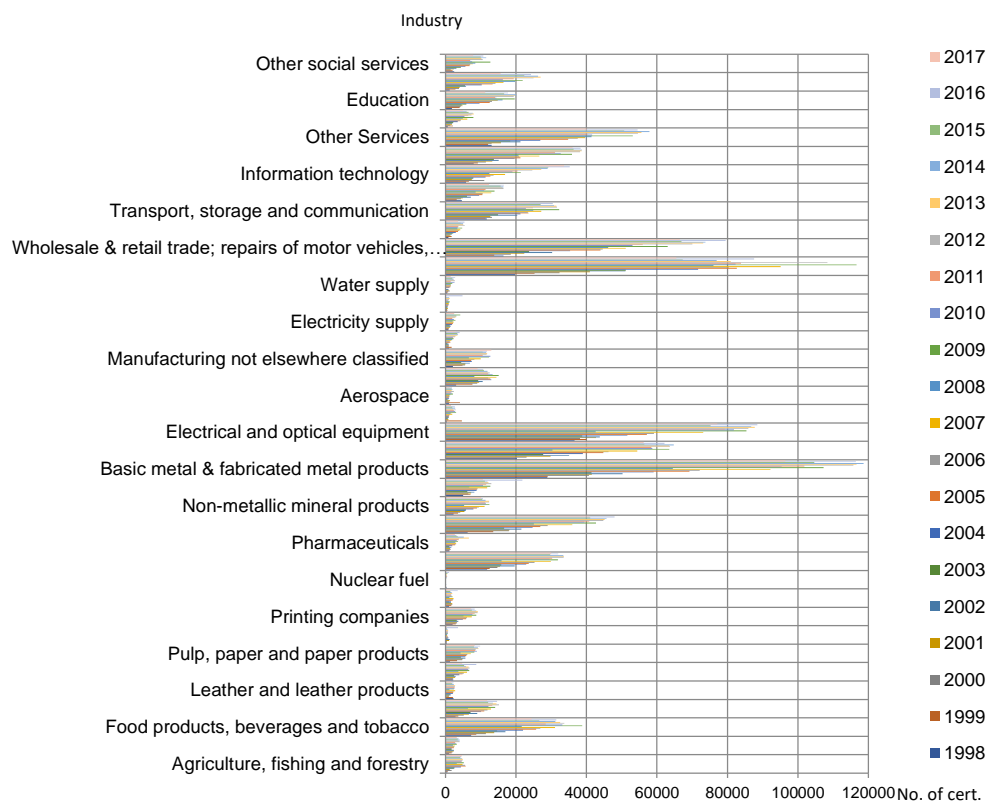


Fig. 1. ISO 9001 by industrial sector in the world (1998-2017)

Source: own study based on (The ISO Survey 1998-2017, Switzerland, 2018)

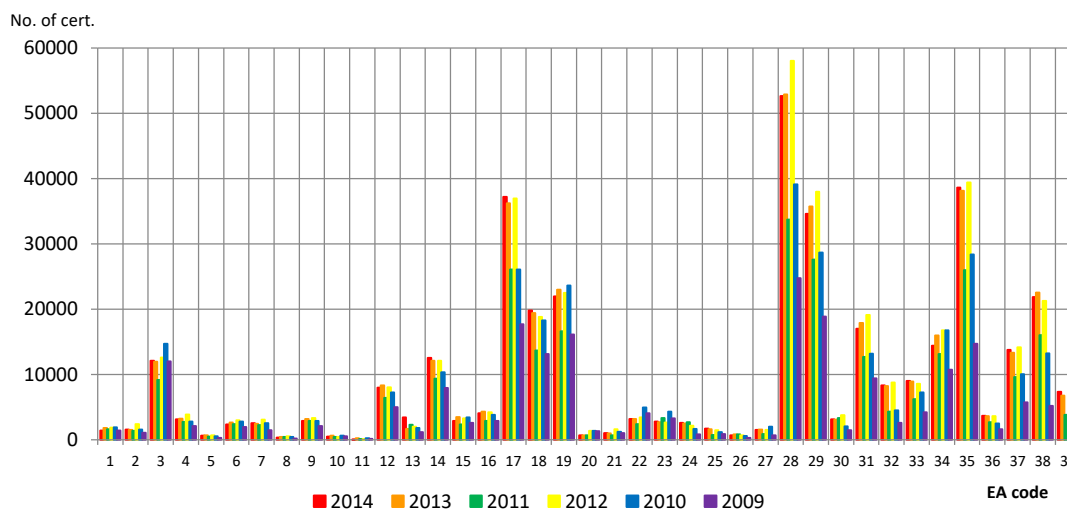
On the other hand however, it allows isolating sectors for which the ISO 9001 incorporation is executed in an incidental and widespread manners.

A review of general data concerning the number of ISO 9001 incorporations, in terms of sector assignment, allowed for isolating the sectors for which the ISO 9001 incorporation is executed globally in a widespread and incidental manner.

The industry sectors that feature widespread incorporations in the global scale are as follows: Basic Metals & Fabricated Metal Products; Construction; Electrical & Optical Equipment; Wholesale & Retail Trade; Repair of Motor Vehicles; Motorcycles & Personal & Household Goods; Machinery & Equipment; Other Services and Rubber & Plastic Products. On the other hand, the sectors in which the ISO 9001 incorporations are incidental include, among others, the following: Nuclear Fuel; Publishing Companies; Gas Supply; Water Supply; Manufacture of Coke & Refined Petroleum Products; Aerospace and Shipbuilding.

3.2. ISO 9001 by industrial sector in the Europe

In terms of the data quantity, the subsequent analysis was spatially limited and only covered European countries. Due to the lack of data for the Vatican and Macedonia, 44 out of 46 European countries were analysed. Moreover, in 2009 there was also no data available for Luxembourg. An extended data analysis was conducted in the next stage. The issue concerned analysing and comparing the data in terms of leading and incidental sectors. It was interesting to verify whether global data concerning the number of ISO 9001 incorporations for particular industrial sectors will be reflected in the number for Europe (Fig. 2).



* no data on Luxembourg for 2009 are available

Fig. 2. ISO 9001 by industrial sector in the Europe (2009-2015)

Source: own study based on (The ISO Survey 1998-2017, Switzerland, 2018)

In European countries, the most common ISO 9001 incorporations are executed in the following sectors: Construction; Wholesale & Retail Trade, Repair of Motor Vehicles; Motorcycles & Personal & Household Goods; Other Services; Basic Metals & Fabricated Metal Products; Electrical & Optical Equipment and Health & Social Work. On the other hand, the least ISO 9001 incorporations was recorded in such sectors as:

Nuclear Fuel; Publishing Companies; Manufacture of Coke & Refined Petroleum Products; Leather & Leather Products and Gas Supply.

3.3. ISO 9001 according to the industrial sector in the world - detailed data

The analysis of particular sectors demonstrated that the industry that most often incorporates the ISO 9001 globally is Construction, whereas the least often - Nuclear fuel (Table 2). For researchers dealing in particular sectors and their evolution in terms of developing and implementing the ISO 9001 standard, the data specified in Table 2 provide detailed information on the number of the standard's incorporations.

Table 2

ISO 9001 the number of the standard's incorporations by sectors

EA CODE	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	610	678	1745	1265	2381	2584	4359	5797	5540	4896
2	1052	1791	2028	2359	2423	1758	1801	2436	2508	2673
3	7347	8746	11440	13805	17038	14682	2203	2573	2687	3106
4	2835	3673	5178	6706	9071	7151	1013	1102	1189	1293
5	2313	2093	926	1063	1490	1394	2118	2252	2350	2726
6	2218	1967	2225	2791	2910	2483	3971	4824	5196	6130
7	1316	3279	4785	4961	5693	4375	5674	5929	6218	7171
8	363	354	445	1048	1212	617	844	697	608	539
9	1998	2939	3299	3191	3630	3234	4965	5808	6168	7518
10	1009	1669	1929	1927	1620	1052	1614	2072	2199	2324
11 Nuclear	279	220	115	96	192	68	69	131	167	125
12	11803	12615	14790	15505	19612	15806	2291	2368	2530	2992
13	1160	1105	1451	1349	1697	1160	1943	2757	3061	3062
14	6277	13575	18036	18243	21517	16683	2472	2694	2898	3602
15	2328	3571	4209	5363	5753	5847	7977	8973	9482	1112
16	4998	7107	6467	7290	8218	6217	8812	8956	9142	1180
17	28885	28972	40713	41534	50234	41455	5904	6919	7210	9223
18	20275	19827	23027	29812	35047	27705	3902	4478	4629	5443
19	36653	40035	38148	42710	43839	38782	5162	5716	5913	7313
20	398	4670	589	881	689	984	972	1030	1192	1917
21	1052	4131	924	1314	866	606	1025	967	1161	1113
22	3040	7656	9072	9573	10561	9311	1299	1273	1213	1451
23	2106	4844	5534	5680	6914	4535	7500	7293	8188	1007
24	1001	1765	932	959	966	580	989	1445	1199	1639
25	860	932	979	1349	1503	1190	1887	2163	2251	2323
26	390	558	531	664	584	559	658	863	975	911
27	505	799	1242	932	874	138	1136	1404	1525	1551
28	19768	25273	32389	40948	51093	51188	7165	8266	8043	9507
29	16451	13803	18530	22385	30280	23751	3538	4397	4462	5118
30	865	1794	1187	1500	1840	2245	2924	3557	3875	4186

Table 2
ISO 9001 the number of the standard's incorporations by sectors cont.

EA CODE	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
31	11738	11366	13181	12732	20356	14955	21265	23520	23372	27202
32	4690	3218	4367	4950	7195	6149	9559	10452	10604	13008
33	5826	6706	11067	7529	7777	7906	11412	12785	13674	16962
34	8064	9201	11451	13303	15089	13738	19657	21277	20969	26683
35	13088	12150	13160	15762	21270	18379	26954	34825	37507	39657
36	689	2086	1404	1840	1932	2229	3457	4213	4371	6208
37	1833	3996	4282	4879	4544	5915	9625	12607	13200	14832
38	1250	2871	3820	4010	5807	5561	10295	13389	14180	16516
39	2513	2005	1529	2372	3111	4413	5657	6817	7073	7750
Total	22984	274040	31712	35458	42682	36738	52863	60714	62574	74314

Source: (The ISO Survey 1998-2017, Switzerland, 2018)

Table 2
ISO 9001 the number of the standard's incorporations by sectors cont.

EA CODE	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	3190	5234	4595	4683	4883	4953	4701	4236	4474	4655
2	2164	3204	2955	2766	4039	3479	3992	3535	3759	3212
3	2160	38817	3319	28434	33705	32519	31182	26602	31469	2449
4	6404	14105	1222	13319	15176	14461	13467	12081	14640	1185
5	1136	2369	2538	2562	2712	2728	2431	1908	2338	1669
6	3691	6759	6498	6284	6823	6535	5830	5312	8776	4771
7	4328	8192	8970	8521	8556	9405	9179	8156	9832	8326
8	513	670	707	657	775	724	595	409	3559	393
9	5084	8732	7624	8341	9161	9223	8769	7500	8287	7335
10	1096	2002	1792	1626	1669	1955	1742	1445	3480	1416
11 Nuclear	94	257	330	465	321	433	168	569	1002	310
12	1592	31880	2955	30278	33583	33610	33432	29744	31993	2997
13	2722	3588	3222	3766	3840	6710	5200	3532	3090	2679
14	2510	42682	3942	40854	44769	45204	45674	41101	48010	4093
15	5328	12447	1148	11305	12392	12367	11380	10441	10634	1011
16	6790	12709	1065	11567	13065	12250	11979	11234	21872	1065
17	6451	10725	9537	10184	11573	11660	11865	10465	11645	9634
18	3033	63523	5868	58427	63723	63497	64817	56413	62118	5626
19	4260	85357	8189	79237	85969	87797	86728	75260	88482	7715
20	1526	3056	2783	2396	2952	2131	2738	1930	2636	1597
21	1399	2105	1758	1464	2359	1776	2078	1783	1853	1133
22	8228	15086	1341	12141	12544	11899	11926	10972	10653	9161
23	6647	12386	1276	10533	11642	11823	11538	10558	11799	1300
24	1918	2342	2104	2648	2869	3371	3603	3432	4074	2948
25	2006	2854	2404	1948	2681	3069	3094	4249	2397	2462
26	1011	1210	871	612	1003	1254	1043		4892	435
27	1526	1991	2602	1535	2658	2318	2341	1948	2777	1537
28	7604	11667	8226	83864	10839	80920	76915	67354	87605	6551

Table 2

ISO 9001 the number of the standard's incorporations by sectors cont.

EA CODE	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
29	46180	63015	53051	55961	70082	73167	73756	66975	79492	66463
30	3437	4731	3499	3664	5496	5021	5045	4340	5398	3565
31	24899	32286	22804	24846	31679	31490	30845	27053	30418	23948
32	8571	13900	11057	11423	16445	16198	16469	15621	16532	12348
33	12505	21410	18998	20467	24690	27229	28995	29162	35268	33664
34	20761	35909	32726	31086	38160	38659	38694	36346	38396	36107
35	41404	53116	41615	40303	54572	55602	57860	50696	54506	40122
36	4911	7938	5399	6468	7428	8039	7732	6580	6058	4908
37	16242	19689	14511	14141	19379	19713	20079	16657	17703	11270
38	19712	21909	16278	19351	25036	26992	26243	22342	24320	15628
39	8518	12748	7620	6987	10601	10240	11579	10017	10711	7843
Total	550076	894133	760243	766778	911564	895363	892491	792145	921760	746204

Source: (The ISO Survey 1998-2017, Switzerland, 2018)

4. CONCLUSION

In comparison, the situation for global and European data in terms of sectors leading and incidentally incorporating the ISO 9001 is similar.

Both globally and in Europe, the leading sectors are as follows: Basic Metals & Fabricated Metal Products; Construction; Electrical & Optical Equipment; Wholesale & Retail Trade; Repair of Motor Vehicles Motorcycles & Personal & Household Goods; Other Services. However, globally, slightly differently than in Europe, an important part is played by ISO 9001 incorporations in the following sectors Machinery & Equipment and Rubber & Plastic Products.

Meanwhile, Europe's Health & Social Work sector, which is also a leading sector, attracts attention. On the other hand, incidental cases are visible both globally and in Europe and include such sectors as: Nuclear Fuel; Publishing Companies; Gas Supply; Manufacture of Coke & Refined Petroleum Products. It is worth noting the small number of incorporations in Europe's Leather sector.

In consequence, it is possible to observe that for 39 sectors, 14 are sectors which feature the most ISO 9001 incorporations. These include the following sectors: Health & Social Work; Education; Other Services; Engineering Services; Information Technology; Transport, Storage & Communication; Wholesale & Retail Trade; Repair of Motor Vehicles, Motorcycles & Personal & Household Goods; Construction; Electrical & Optical Equipment; Machinery & Equipment; Basic Metals & Fabricated Metal Products; Rubber & Plastic Products; Chemicals, Chemical Products & Fibres and Food products, Beverages & Tobacco. This results from the sectors' specificity. It also seems that companies used the ISO 9001 to establish a specific communication code which not only constitutes a basis for co-operation, but also facilitates compatibility between particular parts of the world that differ in many aspects. The least ISO 9001 incorporations take place in such countries as Nuclear Fuel and Publishing Companies. It is also worth mentioning the study's limitations. For European countries, detailed statistics of the number of ISO 9001 incorporations for particular industrial sectors are available for 2009-2014, which constitutes a certain study limitation. The lack of detailed data can result from the standard's modification of 2015. Many companies have

incorporated the standard prior to 2015 due to concerns about changes, which can also be the cause of lack of data availability.

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