

Cost and Benefits of Implementing an Occupational Safety and Health Management System (OSH MS) in Enterprises in Poland

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This article presents a method of assessing the economic outcome of implementing an occupational safety and health management system (OSH MS). Developed at the Central Institute for Labour Protection – National Research Institute (Poland), this method focuses on identifying the economic expenses comprising book-keeping and alternative cost incurred to implement and improve an OSH MS. The method was next used in a study in 20 enterprises. While varying greatly among those enterprises, the alternative cost of implementing and maintaining an OSH MS was much higher than the bookkeeping cost, which was also much lower than the cost of statutory prevention measures. The implementation of an OSH MS resulted in both tangible and intangible benefits, including reduced premiums for work accident insurance.

cost benefits OSH MS assessment enterprises

1. INTRODUCTION

Hardly ever have the matters of occupational safety and health (OSH) been considered in purely economic terms, which is why very few Polish enterprises analyse their cost in this area. If performed at all, most studies do not generally cover the basic OSH-related cost; research is usually limited to the cost of work accidents and preventive measures to ensure compliance with statutory provisions. There is ample literature on this subject [1, 2, 3, 4, 5, 6]. However, many employers in Poland do not realise that improving working conditions can be viewed as an investment where all the economic criteria such as optimum investment outlays, period of return on investment or cost–benefit analysis apply [7, 8, 9, 10].

Economic assessment is done even less frequently with regard to the OSH systems already in place in the enterprises that have implemented and improved their systems. Inadequate economic

analysis mostly results from no knowledge at the level of the enterprise on the basic cost of implementing an OSH management system (MS) or on methods of analysing the cost and benefits of implementing it.

A properly implemented and efficiently operated MS can bring tangible cash benefits. A research project in a Norwegian aluminium foundry showed that considerable savings had been generated thanks to the reduced cost of accidents, lower sickness absence and a reduced number of product complaints within the 10-year period following the implementation and improvement of an OSH MS [11].

Some British enterprises had a very positive experience of implementing an OSH MS. The review of good practices posted by British enterprises on the Health and Safety Executive website is a good example [12, 13]. It shows measures enterprises put in place to improve OSH in excess of the minimum requirements set by law

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and tangible economic benefits achieved thanks to such measures. Many enterprises generated noticeable economic gains expressed by a high rate of return on investment following the implementation of OSH-improving measures [13].

2. METHOD

Carried out in 2005–2007, the research project was expected to

- develop of a method to assess the economic results of implementing an OSH MS;
- verify the method to assess the economic results of implementing an OSH MS in enterprises from different sectors;
- assess the cost and benefits generated as a result of implementing and maintaining an OSH MS.

This project resulted in the development of a method to assess the economic effect of an implemented OSH MS, which was then tested in selected enterprises. The method focuses on the cost and benefits related to the implementation and maintenance of an OSH MS. A questionnaire was used. The approach from Standard No. PN-N-18004:2001 was used to identify the

components of the cost and benefits that result from implementing and maintaining an OSH system [14]. As recommended, the cost included the cost of complying with law requirements, the cost incurred due to improper working conditions and the cost of implementing, maintaining and improving the system (Figure 1).

Five questionnaires were developed to obtain

- data on the working conditions in the enterprise and premiums for social insurance against accidents at work;
- general information on implementing an OSH MS and the results;
- information on the cost of implementing an OSH MS, including the cost of
 - initial review,
 - training related to implementation,
 - dissemination of information,
 - documents,
 - OSH MS planning,
 - external audits and certification,
 - external consultations,
- information on the cost of maintaining an OSH MS, including the cost of
 - administration (e.g., payroll),
 - training courses on maintaining and improving an OSH MS,

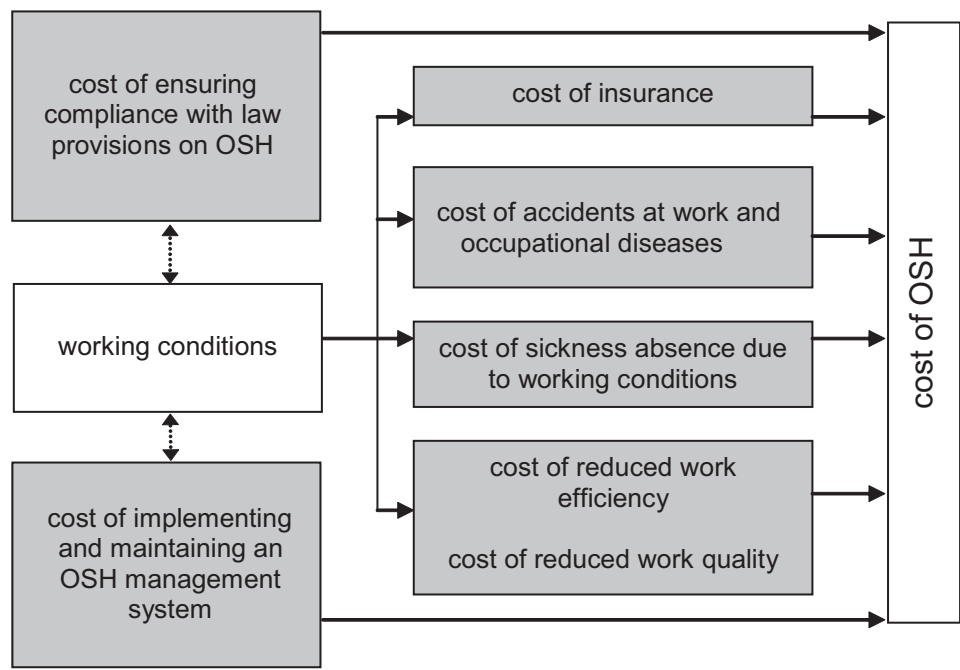


Figure 1. General breakdown of occupational safety and health (OSH) cost [14].

- dissemination of information on maintaining an OSH MS,
- monitoring of working conditions,
- occupational risk review,
- implementation of general and specific OSH-related plans,
- audits,
- investigation of accidents at work, occupational diseases and near-miss accidents,
- documentation,
- initial review by top management,
- system improvement,
- cost of prevention measures in compliance with the relevant law, including the cost of
 - recruitment and payroll of OSH service staff,
 - collective protective equipment and its maintenance,
 - personal protective equipment and protective clothing,
 - cleaning and washing products,
 - measurement of occupational exposure,
 - occupational risk assessment,
 - medical tests,
 - training in OSH,
 - organisation and maintenance of rescue and firefighting services,
 - promotion, information and communication.

The questionnaires were used to study the cost of implementing and maintaining OSH MS in 2006–2007. They covered 20 enterprises with 37400 employees (Table 1). In terms of size, very large enterprises predominated (nine enterprises with over 1500 employees each) as well as those with the staff of 150–650 employees (nine enterprises). Two enterprises had 50–60 employees. The enterprises varied in terms of their respective lines of business and geographical location across Poland.

Additional research focused on 10 of the 20 enterprises to determine the cost of prevention

TABLE 1. Employment and Accidents at Work in the Studied Enterprises in 2006

Enterprise	Line of Business	Employees	Accidents	Accidents per 1000 Employees
A	Mining metal ore	4332	218	50.3
B	Manufacturing turbines and engines	1544	45	29.2
C	Manufacturing machines and electrical devices	644	13	20.2
D	Manufacturing and distribution of electrical power	4370	35	8.0
E	Postal services	11047	129	11.7
F	Producing and distributing heat	273	5	18.3
G	Manufacturing organic chemical products	1706	18	10.6
H	Mining services	161	5	31.1
I	Producing and distributing heat	480	5	10.4
J	Beer brewing	274	2	7.3
K	Manufacturing products derived from oil refining	5560	25	4.5
L	Manufacturing toiletries and cosmetic products	323	0	0.0
LL	Manufacturing metal finished products	1534	92	60.0
M	Manufacturing metal products	2730	27	9.9
N	Manufacturing rolling stock	554	1	1.8
O	Water intake and purification, excluding water supply service	56	0	0.0
P	Construction industry	295	10	33.9
R	Manufacturing products for construction industry	232	6	25.9
S	Manufacturing chemical products	53	0	0.0
T	Business activity unknown	1240	21	16.9
total		37400	657	17.6

Notes. Source: own calculations.

measures aimed at ensuring compliance with the minimum statutory requirements; it was then compared with cost of implementing and maintaining an OSH MS.

In 2006, there were 657 accidents at work in the enterprises in this study. The accident rate was 17.6 (per 1000 employees per year) with the highest accident rate in the enterprise manufacturing metal finished products (60.0).

OSH MSs were implemented in 19 enterprises, mainly in accordance with Standard PN-N-18001:2004 or PN-N-18001:1999¹. Some of those enterprises, representing mainly foreign capital or operating on the West European markets, also implemented their OSH MSs on the basis of Standard No. OSHAS 18001:2007 [15]. The average period of OSH MS implementation was 12 months. Eleven enterprises, out of the 19, implemented their OSH MSs in 2004–2005, six in 2000–2002, two in 2006–2007. The implementation of an OSH MS was still underway in one enterprise at the time of the study.

The study revealed that 16 enterprises had implemented quality MSs and 14 had certificates confirming the implementation of environmental MSs. Out of the 20 enterprises in the study, 12 had an integrated MS comprising quality, the environment and OSH.

This analysis of the cost of implementing and maintaining an OSH MS covers both alternative² and bookkeeping cost while seeking to answer three questions:

- What was the cost of implementing and maintaining an OSH MS (including economic and alternative cost)?
- What was the cost of outlays to implement and maintain an OSH MS in relation to the

expenses for prevention measures to ensure compliance with statutory requirements?

- What was the perception, in quantitative and qualitative terms, of the benefits resulting from implementing an OSH MS?

3. RESULTS

3.1. Cost of Implementing an OSH MS

3.1.1. Bookkeeping cost

Calculated per enterprise, the bookkeeping cost of implementing an OSH MS was 67 000 USD³ (Table 2). The average cost in the enterprises with over 1500 employees was almost 104 000 USD, and over 34 000 USD in those with under 650 employees. The highest cost of implementing an OSH MS was recorded in the ore mining enterprise, whereas the lowest in the construction business and in the enterprise manufacturing chemical products. The low cost in both enterprises resulted from several implementation stages carried out with the aid from external institutions, so the enterprises did not bear any bookkeeping cost as they both benefited from the SMIP programme⁴.

The largest item in the cost of implementing an OSH MS was the cost of administration comprising the payroll of the representative for OSH matters and an OSH MS unit for the period of the system implementation, and the cost of materials and equipment (e.g., furniture and computer hardware). Other large items in the cost of implementation were (a) training top and other management, internal (second-party) auditors and the team implementing the OSH MS; and (b) external (third-party) audit and certification.

¹ PN 18001 is an abbreviated name of an OSH MS according to Standard No. PN-N-18001:2004. The OSH MS in the standard is based on the Deming circle of continuous improvement. Standard No. 18001 was published in 1999, its amended version in 2004 (by Polski Komitet Normalizacji, Polish Committee for Standardization). The standard defined a set of requirements, which, once met, provided the basis for a given enterprise to apply for certification. The structure of this standard resembles that of the ISO 9000 series for quality and environment management systems. The Polish standard is equivalent to OHSAS 18001:2007 [15]. They are almost identical, and so are the systems implemented in line with either of them.

² Alternative cost is the cost of missed opportunities, e.g., when employees stop their usual work when assigned a task related to implementing or maintaining the OSH MS.

³ The cost of OSH MS has been converted from PLN to USD according to an average exchange rate of the National Bank of Poland (the arithmetic mean for 12 months in 2007).

⁴ SMIP (Safety Management Implementation Programme) was a programme run in 1999–2003 by the Central Institute for Labour Protection in conjunction with the National Labour Inspectorate (PIP) to promote and implement OSH MS in enterprises that voluntarily joined the programme.

TABLE 2. Bookkeeping Cost of Implementing an Occupational Safety and Health Management System (OSH MS) (USD)

Category	Bookkeeping Cost		
	Total	(%)	Per Enterprise
Total	1 140 047	(100)	67 061
Enterprises with			
<650 employees	309 180	(27.1)	34 353
>1500 employees	830 866	(72.9)	103 858
Cost of			
administration	582 708	(51.1)	34 277
initial review	24 607	(2.2)	1 447
training	269 971	(23.7)	15 881
dissemination of information	17 563	(1.5)	1 033
documentation	25 538	(2.2)	1 502
planning	6 300	(0.5)	370
external audits and certification	112 361	(9.9)	6 609
external and internal consultations, other	101 000	(8.9)	5 941

Notes. Source: own calculations.

TABLE 3. Alternative Cost of Implementing an Occupational Safety and Health Management System (OSH MS) (USD)

Categories	Alternative Cost					
	Total	(%)	OSH Employees	(%)	Other Employees	(%)
Total	3 756 976	(100)	710 084	(100)	3 046 892	(100)
Cost of						
initial review	732 950	(19.5)	110 741	(15.6)	622 209	(20.4)
training	1 250 870	(33.3)	14 144	(2.0)	1 236 725	(40.6)
dissemination of information	229 647	(6.1)	78 975	(11.1)	150 672	(4.9)
documentation	763 054	(20.3)	445 790	(62.8)	317 264	(10.4)
planning	37 451	(1.0)	15 337	(2.2)	22 114	(0.7)
other	743 005	(19.8)	45 099	(6.3)	697 906	(22.9)

Notes. Source: own calculations; OSH employees—employees implementing OSH MS.

3.1.2. Alternative cost

Alternative cost items represent the payroll-covered workload of employees related to implementing an OSH MS. In the 20 enterprises in the study, data on alternative cost were found in seven enterprises. The respective cost was calculated as the product of the gross hourly remuneration rates of the employees engaged in the tasks related to implementing an OSH MS or involved in the process, and their duration, or the number of days and the number of employees involved. The alternative cost of implementing an OSH MS was ~542 000 USD per enterprise.

Alternative cost concerned mainly training courses on OSH MS implementation, development of documentation and initial review (Table 3). The implementation of those tasks accounted for 73% of the total alternative cost. Eighty-one percent of the alternative cost was the cost of employees' participation in training sessions and initial review. Alternative cost borne on account of employees tackling specific tasks related to implementing an OSH MS included mainly developing documentation and disseminating information about the OSH policy, and developing in-house procedures and instructions.

The cost in this group accounted for ~63% of the total alternative cost.

3.2. Cost of Maintaining OSH MS

3.2.1. Bookkeeping cost

The bookkeeping cost of maintaining an OSH MS in the enterprise was calculated for 15 enterprises. The annual cost per enterprise exceeded 64 000 USD (Table 4). The average cost in enterprises with over 1500 employees was over 79 000 and 46 000 USD in enterprises with over 650 employees.

The cost of administration was the largest item in the cost of implementing an OSH MS and, representing 58% of the total, was also the largest item in the cost of maintaining the system. It includes, like in the case of OSH MS implementation, the payroll of the representative for OSH MS along with the upkeep of the OSH MS unit.

In nominal terms, the cost of administration is followed by such items as the cost of training activities related to OSH MS maintenance and improvement, system auditing and dissemination

of information on maintaining the MS. The cost of training on maintaining and improving an MS includes in-house and external training for top management, executive staff, internal auditors and other personnel.

3.2.2. Alternative cost

In the 20 enterprises in this study, six provided data on the alternative cost of maintaining an OSH MS. The most sizeable items included the cost of monitoring working conditions, training courses on maintaining and improving the system as well as assessing occupational risk (Table 5).

Eighty-nine percent of all alternative cost was borne on account of employees' engagement in maintaining an OSH MS. Their work was mainly related to training on maintaining and improving an OSH MS, and monitoring working conditions.

The cost borne in connection with employees engaged in various tasks comprised mostly assessing occupational risk and monitoring working conditions (73% of the total alternative cost of maintaining and improving an OSH MS).

TABLE 4. Bookkeeping Cost of Maintaining an Occupational Safety and Health (OSH) Management System in the Enterprise (USD)

Category	Bookkeeping Cost		
	Total	(%)	Per Enterprise
Total	964 961	(100)	64 331
Enterprises with			
<650 employees	326 188	(33.8)	46 598
>1500 employees	638 773	(66.2)	79 847
Cost of			
administration	562 852	(58.3)	37 523
training	142 274	(14.7)	9 485
dissemination of information	57 329	(5.9)	3 803
monitoring working conditions	48 383	(5.0)	3 226
risk assessment	2 690	(0.3)	179
implementation of plans	19 350	(2.0)	1 290
audits	95 593	(9.9)	6 373
investigation of accidents and diseases	3 191	(0.4)	213
documentation	2 924	(0.3)	195
management review	4 419	(0.5)	295
improvement, other	26 137	(2.7)	1 743

Notes. Source: own calculations.

TABLE 5. Alternative Cost of Maintaining an Occupational Safety and Health Management System (OSH MS) in the Enterprise (USD)

Category	Alternative Cost					
	Total	(%)	OSH Employees	(%)	Other Employees	(%)
Total	46395650	(100)	5076414	(100)	41319236	100)
Cost of						
training	11533094	(24.9)	8996	(0.2)	11524098	(27.9)
dissemination of information	410713	(0.9)	156771	(3.1)	253942	(0.6)
monitoring working conditions	12702674	(27.4)	1749917	(34.5)	10952756	(26.5)
risk assessment	5255847	(11.3)	1952498	(38.5)	3303348	(8.0)
implementation of plans	796585	(1.7)	418679	(8.3)	377906	(0.9)
audits	1264129	(2.7)	50374	(1.0)	1213755	(2.9)
other	15082429	(32.5)	739180	(14.6)	14343249	(34.7)

Notes. Source: own calculations; OSH employees—employees implementing OSH MS.

TABLE 6. Changes in Accidents at Work, Work Accident Insurance Premiums and Sickness Absence in Selected Enterprises in 2006¹

Item	Enterprise (%)						
	B	D	G	M	N	P	R
Accidents at work							
total	55.2	−10.3	20.0	−40.0	−83.3	−23.1	−33.3
per 1000 employees	40.7	1.3	23.9	−38.9	−78.7	−21.2	−35.9
Insurance premium							
average for a group of branches	2.3	1.7	2.3	2.3	2.3	2.0	2.3
for the enterprise	2.0	1.6	2.3	2.0	2.3	2.0	1.8
Sickness absence							
total (days)	−13.9	−1.1	−3.2	—	9.5	—	−5.0
per employee (days)	−20.6	0.5	0.0	—	27.2	—	−8.5
total	−6.3	1.5	9.4	—	50.5	—	−5.0

Notes. 1—data for 2003 = 100%. A dash indicates data are not available. For information on enterprises, see Table 1. Source: own calculations.

3.3. Benefits Resulting From Work on OSH MS Maintenance and Improvement

3.3.1. Quantitative assessment

The results of the study are a basis for an attempt to assess the benefits of maintaining and improving an OSH MS. The assessment was based on selected data on the number and rate of accidents at work, the number of employees exposed, the rate of exposure to hazardous conditions at work, and data on sickness absence and its cost. Furthermore, some data had been collected on the rates applied and the premiums

paid to Poland's Social Insurance Institution (ZUS) for work accident insurance.

The assessment of the results of implementing an OSH MS comprised seven enterprises that implemented their MSs in 2000–2003 and were included in all parts of the study. The analysis of accidents at work for 2003–2006 in the enterprises included in the study shows, except for enterprise B, a clearly declining trend in terms of both the number of accidents and their rate (Table 6).

The analysis also covered the premium rates for the branches in which the enterprises operated. Table 6 shows the premiums decreased in relation

to the average set for a given group of branches. For enterprise R, it decreased by the maximum allowed rate, i.e., 20%. For three enterprises, enterprises G, N and P, the premium was set at the average amount in a given group of branches. It is noteworthy that no enterprise had a premium increased above the average.

As regards sickness absence, full data were available in five enterprises only. Enterprise B recorded the most pronounced decline; their data for 2003–2006 showed that sickness absence fell by ~20% per employee. Sickness absence increased in enterprise N only.

3.3.2. Qualitative assessment

The study also assessed changes in the enterprises and their causes, taking account of workforce fluctuation, work efficiency, performance level, work ethics, etc. The assessment considered subjective opinions of enterprise representatives. Six enterprises supplied more comprehensive information.

Representatives of those enterprises indicated that workforce decreased and the employment structure reflected better the way the enterprises were organised. There was also a general trend to increase employment. The reasons included a growing number of orders received thanks to

the global economy growth in a given branch, restructured employment in the enterprise, stable employment conditions, improved management, enhanced employee awareness and a more responsible approach to safe work.

In some enterprises, the increasing work efficiency trend had been observed for some years, whereas in others it increased earlier and reached a high, European level, which ensured profitability. This resulted from the requirements set by the customers and the development of the market in general, on the one hand, and rationalised employment and elimination of stoppages on the other thanks to a more suitable assignment of tasks and duties, and enhanced commitment of employees.

The representatives of all six enterprises underlined that the steady, perceptible process of quality improvement had been underway for several years, especially since a quality MS was put in place. There was a simultaneous decrease in poor craftsmanship and inferior quality. This was ensured to provide top quality services and products thanks to best technologies and expertise. The growing requirements of the market and clients, and the implementation of the policy on quality made those changes possible.

TABLE 7. Prevention Cost in 10 Enterprises (USD)

Category	Prevention Cost			
	Total	(%)	Per Enterprise	Per Employee
OSH service staff and their payroll (in-house)	1 217 161	(4.5)	121 716	44
Collective protective equipment	791 527	(2.9)	219 253	29
Personal protective equipment	4 077 271	(15.0)	407 727	146
Cleaning staff	607 990	(2.2)	60 799	22
OSH services (outsourced)	252 996	(0.9)	25 300	9
Medical check-ups and testing	2 046 270	(7.5)	204 627	73
Training	1 715 114	(6.3)	171 511	61
Rescue services	2 845 735	(10.5)	284 574	102
Promotion and information	193 791	(0.7)	19 379	7
Investment	9 533 242	(35.0)	953 324	342
Other	3 950 794	(14.5)	395 079	142
total	27 227 553	(100)	2 723 189	992

Notes. OSH—occupational safety and health. Source: own calculations.

3.4. Cost of Prevention

The cost of prevention measures to ensure compliance with the relevant law provisions was determined to compare it with the cost of implementing and maintaining an OSH MS in the 10 enterprises. The average cost of prevention measures was 2723000 USD per enterprise and 992 USD per employee (Table 7).

The investment outlays to improve the working conditions were a major cost (35% of the total cost of prevention). Personal protective equipment (including the cost of washing or leasing protective clothing) was another significant item in this cost group, followed by organisation and maintenance of rescue services, medical check-ups and testing, and training. An analysis of the cost indicates that it varied considerably among the enterprises.

4. DISCUSSION

The cost analysis of implementing and maintaining an OSH MS covers both bookkeeping and alternative cost. Furthermore, it indicates that their joint evaluation is necessary to present the overall economic cost. However, this could only be done in the six enterprises that provided relevant data on the alternative cost of implementing and maintaining an OSH MS.

The bookkeeping cost ranged from over 48000 USD in enterprise C to over 240000 USD in enterprise A (Table 8). This accounts for 15.5% of the total economic cost, which means

that the average alternative cost was 6.5 times higher than that of bookkeeping, which accounted for ~25% of the economic cost. The alternative cost was 4 times higher than the bookkeeping cost in only two enterprises, enterprises F and M.

The economic cost of implementing and maintaining an OSH MS in the six enterprises was 186 USD per employee; it varied greatly by enterprise, from 948 USD in enterprises F to 91 USD in enterprise E.

Table 9 presents data on the economic cost of maintaining an OSH MS, including the alternative and bookkeeping cost in each of the six enterprises. The data indicate that the alternative cost of maintaining an OSH MS was ~46396000 USD in six enterprises accounting for ~98.9% of the total economic cost, so the alternative cost of maintaining an OSH MS was over 90 times higher than the cost of bookkeeping. Compared with the alternative cost of implementing an OSH MS of 3670000 USD (Table 8), the cost of maintaining an OSH MS was almost 13 times higher.

The economic cost of maintaining an OSH MS was 2004 USD per employee per year. The cost varied from 6700 USD in enterprise A and over 6500 USD in enterprise F, to 157 USD in enterprise M.

A comparison of the cost of implementing and maintaining an OSH MS with the cost of ensuring compliance with the current statutory requirements marked another stage of the study. To this end, the bookkeeping cost of implementing and maintaining an OSH MS in the 10 enterprises and

TABLE 8. Economic Cost of Implementing an Occupational Safety and Health Management System (OSH MS) in 6 Enterprises (USD)

Enterprise	Economic Cost		Bookkeeping Cost			Alternative Cost		
	Total	Per Employee	Total	Per Employee	(%)	Total	Per Employee	(%)
A	1932414	446	240404	56	(12.4)	1692010	391	(87.6)
C	259273	260	48375	75	(18.7)	210897	327	(81.3)
D	451903	103	84657	19	(18.7)	367245	84	(81.3)
E	1001610	91	122708	11	(12.3)	878903	79	(87.7)
F	258841	948	65805	241	(25.4)	193036	704	(74.6)
M	437415	160	109173	40	(25.0)	328242	120	(75.0)
total	4341456	186	671122	29	(15.5)	3670334	157	(84.5)

Notes. Economic cost = 100%. For information on enterprises, see Table 1. Source: own calculations.

TABLE 9. Cost of Maintaining an Occupational Safety and Health Management System in 6 Enterprises (USD)

Enterprise	Economic Cost		Bookkeeping Cost			Alternative Cost		
	Total	Per Employee	Total	Per Employee	(%)	Total	Per Employee	(%)
A	29341917	6773	155307	99	(0.5)	29186610	6738	(99.5)
C	213951	332	43502	68	(20.3)	170449	733	(79.7)
D	10510285	868	48303	4	(0.5)	10461982	2394	(99.5)
E	4623617	418	106173	9	(2.3)	4517444	409	(97.7)
F	1777840	6512	52669	193	(3.0)	1725171	6319	(97.0)
M	428579	157	94585	35	(22.1)	333994	122	(77.9)
total	46896189	2004	500539	21	(1.1)	46395650	1983	(98.9)

Notes. Economic cost = 100%. For information on enterprises, see Table 1. Source: own calculations.

TABLE 10. Cost of Occupational Safety and Health Management System (OSH MS) Implementation and Maintenance Compared to Cost of Prevention Measures (as Required by Law) in 10 Enterprises (USD)

Enterprise	OSH MS Implementation		OSH MS Maintenance		Prevention	
	Total	Per Employee	Total	Per Employee	Total	Per Employee
A	240404	55	155307	36	10248722	2366
B	96390	62	83935	60	1765524	1269
C	48375	75	43502	68	132996	207
D	84657	19	48303	10	9378207	1995
E	122708	11	106173	10	832013	75
F	65805	241	52669	193	297412	1090
G	28076	16	27798	16	1206906	708
M	109173	40	94585	35	1518029	556
N	75632	137	71841	130	1536661	2774
R	21155	91	43845	189	311083	1341
total	892375	33	727958	27	27227553	993

the cost of prevention were compared (Table 10). The cost of implementing and maintaining an OSH MS was very low in the 10 enterprises compared with that of prevention.

There was a considerable difference in the cost between the enterprises with under 650 employees and those with over 1500 (Figure 2). In enterprises with under 650 employees, the cost of implementing an OSH MS per employee was 125 USD; it was nearly 5 times higher than the same cost in enterprises with over 1500 employees. The difference was more pronounced in the cost of maintaining an OSH MS. In enterprises with under 650 employees it was also 125 USD per employee per year, i.e., almost

7 times more than in those with over 1500 employees.

The cost of complying with law requirements per employee in the 10 enterprises was 992 USD. In enterprises with under 650 employees, it was 1345 USD per employee per year, i.e., 39% higher than in enterprises with over 1500 employees.

The analysis of financial gains resulting from implementing and maintaining an OSH MS was based on a comparison of data in the four enterprises whose accident insurance premium rates decreased in 2006, compared with the 2003 baseline year.

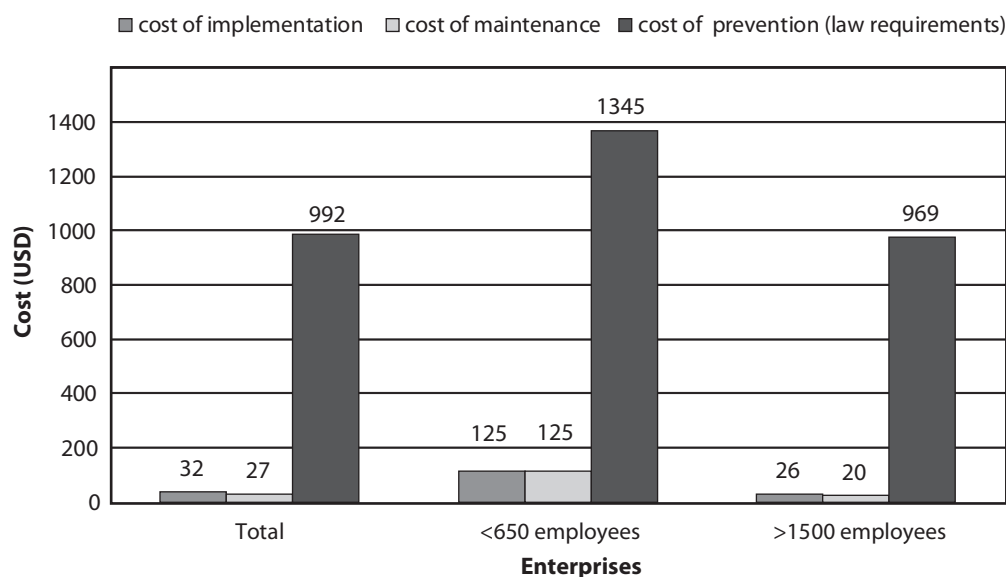


Figure 2. Cost of implementing and maintaining an occupational safety and health management system (OSH MS) by size of enterprise.

To assess the economic gains resulting from implementing and maintaining an OSH MS, the amounts resulting from reduced rates of work accident insurance premiums were compared with the cost of implementing and maintaining an OSH MS in the four enterprises (enterprises B, D, M and R).

Table 11 shows that ZUS applied a 10% reduction of the contribution base rate in relation to that determined for a branch to enterprises B, D and M, and a premium base rate reduction of 20% to enterprise R. The reductions in insurance contributions for the four enterprises, in nominal terms and as percentage rate reduction, were compared with the cost of implementing and maintaining an OSH MS. The comparison showed that in two enterprises (D and M), the gains obtained thanks to the reduced insurance contributions were high and considerably exceeded the bookkeeping cost.

In the very large enterprise D, the benefits of a reduced contribution base rates were more than double the amount of the cost incurred to implement an OSH MS, and they were 3.5 times higher than the amount of respective bookkeeping cost of maintaining an OSH MS. In the medium-size enterprise R, the benefits of a reduced base rate accounted for 144% of the cost of implementing an OSH MS, and almost 70% of the cost of maintaining the system. In the two other enterprises, the gains generated thanks to a 10% reduction of the base rate ranged from over 22 to 42% of the total cost.

Given the currently available data and studies, it is difficult to analyse the results of implementing and maintaining OSH MSs in the enterprises studied, mainly because the system was implemented over three years (2004–2006), so

TABLE 11. Premiums for Work Accident Insurance and Cost of an Occupational Safety and Health Management System in 4 Enterprises (USD)

Enterprise	Cost		Premium			
	Implementation	Maintenance	Total	(%)	Implementation (%)	Maintenance (%)
B	96 390	83 935	35 018	(–10)	36.3	41.7
D	80 325	48 303	169 675	(–10)	211.2	351.3
M	109 173	94 585	24 801	(–10)	22.7	26.2
R	21 155	43 845	30 511	(–20)	144.2	69.6

Notes. For information on enterprises, see Table 1. Source: own calculations.

the time perspective is still too short to comprehensively assess the outcome.

5. CONCLUSIONS

Conclusions of this study of the economic outcome of implementing and maintaining an OSH MS follow.

- The bookkeeping cost of implementing and maintaining an OSH MS is relatively low compared to the alternative cost of implementing and maintaining a system and the cost of preventive measures to ensure compliance with the law.
- The bookkeeping cost of implementing and maintaining an OSH MS varies considerably. Per employee, it is much higher in enterprises with under 650 employees than in those with over 1500 employees.
- Regardless of the relatively low bookkeeping cost of implementing an OSH MS, its maintenance involves an alternative cost that exceeds many times that of implementing a system because of the great working time input required of the employees to both implement the system directly, and to participate in the performance of related tasks.
- At the enterprise level, implementing an OSH MS generates both quantitative and qualitative benefits, as confirmed by various studies. Additionally, British enterprises also enhanced their public image.
- Tangible benefits include a reduction in work accidents along with lower premiums for accident insurance in most enterprises. In Poland, those reductions gained importance on April 1, 2009, when a wider range of premium increases/decreases were introduced in relation to the average for branches⁵.
- According to subjective opinions of representatives of enterprises, the intangible (qualitative) benefits include reduced staff fluctuation, increased efficiency of performance and improved quality.

- The more comprehensive assessment of benefits of implementing an OSH MS must be performed over a period of at least 3–5 years. Given the examples and experience gathered in other countries, it is probable that quantitative and qualitative benefits can be much more significant.
- An act on social insurance against work accidents and occupational diseases with a provision on a possible 10% reduction in an insurance premium for enterprises with an OSH MS would increase the economic profitability of implementing and maintaining an OSH MS.

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⁵ As of April 1, 2009, the premium for work accidents insurance for enterprises vary from –50 to 50%, compared to the average for a given branch (formerly it varied from –20 to 20%).

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