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## The method of improving the functioning of an integrated management system in a mining enterprise

### Introduction

In order to fully adapt themselves to the market requirements, mining enterprises have recently implemented standardized quality, occupational safety and health and environmental management systems (Nowak and Pawluk 2016). The standards concerning the individual systems determine the requirements for the application of specific procedures and measures, to implement the adopted policy aimed at achieving the set objectives. The combination of procedures and practices in force in an enterprise is more effective if they are integrated, as compared to actions implemented as part of separate systems. When combined, they function as an integrated management system (IMS). A correctly implemented IMS usually contributes to a more harmonious operation of the enterprise and to eliminating repeated activities within individual systems, and thereby optimizing the costs associated with their implementation and maintenance (Bąk 2018).

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The application of management systems requires their continuous improvement in respect of suitability for the actual needs of the enterprise in the pursuit of its objectives and better performance of its duties. IMS improvements should, therefore, be used to improve competitiveness. To this end, a tool should be used to evaluate the system's level of excellence quickly and in quantifiable terms, adapted to the specificity of mining companies (Bąk and Nowak 2018). This article presents the proposed application of a methodology for scoring the functioning of the integrated management system which utilizes a newly designed ANG procedure.

### 1. General assumptions concerning the methodology for scoring the functioning of the IMS based on the ANG procedure

According to the PWN Polish Dictionary a methodology is “a set of rules concerning the manner of performing specific works” ([sjp.pwn.pl](http://sjp.pwn.pl)). The presented newly devised methodology is a set of rules covering the ways of scoring and improving the effectiveness of an integrated management system in a mining company. Its special nature consists in the possibility of its application in all mining companies which have implemented quality, environmental and occupational health and safety management systems (Nowak 2016). By utilizing them, one can easily collect the most important information from the conducted audits, and carry out measurable evaluations covering observation, non-conformances and specific areas for improvement. Furthermore, in the case of a process approach to management systems, it is possible to introduce virtually any number of processes identified in a given enterprise. This tool can be used to score the individual management systems, as well as the IMS as a whole.

At the beginning of the 21st century, Polish enterprises, including mining companies, began to widely introduce the following management systems:

- ◆ Quality management systems – based on ISO 9001:2006.
- ◆ Environmental management systems – based on ISO 14001:2005.
- ◆ Occupational safety and health management systems – based on (Polish Standard PN-N-18001:2004).

In every company, the implemented management systems are always evaluated on the basis of internal and external audits (Polish Standard PN-EN ISO 19011:2011). Within every management system, the standards specify the manner of performing all activities in accordance with the specified procedures, and the assessment of the individual systems is conducted by checking the implementation of the clauses of the standards, the correctness of the procedures and the activities carried out on their basis. The amendments of ISO standards of 2011 and 2015 recommended that the so-called process approach (Polish Standard PN-EN ISO 9000:2009 and 9001:2009) be applied in the management systems or that environmental management be integrated with the enterprise's business processes (Polish Standard PN-EN ISO 14001:2005). In this case, the systems are not evaluated separately (according to the clauses of individual standards), but rather the correctness of implementing the specific

processes (which can combine the aspects of product quality, environmental protection and occupational health and safety), as defined in the enterprise, is analyzed.

Therefore, audits can be conducted in two ways. The devised methodology of scoring the effectiveness of IMS operation is universal – it includes two different procedures called ANG-standard (*ANG-norma*) and ANG-process (*ANG-proces*), which can be applied depending on the manner of auditing used in a given enterprise (or its branch). This part of the article presents the ANG-standard procedure (Nowak 2018).

## 2. Creating the ANG-standard sheet

As part of the ANG-standard procedure, in order to streamline its use – the input and automatic calculation of data based on the score of the effectiveness of operation of the individual management systems or the entire integrated system – a so-called “Branch Sheet” has been created. For every conducted audit, its aggregate data, such as: the audit number, number of audited processes and organizational units, number of non-conformances, findings and areas for improvement are entered into the sheet, taking the clauses of the applicable standards into account (Fig. 1).

The sheet has been devised using the Excel spreadsheet in which the specific columns are tied to the developed mathematical formulas. After entering the data, the spreadsheet will automatically generate a score, expressed as a numerical value, for the functioning of the individual systems or the IMS, in relation to the entire enterprise or its organizational units. The following mathematical dependences are used in the developed formulas:

- ◆ procedure score by the number of non-conformances  $K_{Nr}$ :

$$K_N = N/P_x \cdot 10 \quad (1)$$

calculated as the quotient of the number of non-conformances “N” and the number of procedures in the analyzed audit  $P_x$ ;

- ◆ procedure score by the number of observations  $K_{Spr}$ :

$$K_{Sp} = Sp / P_x \cdot 10 \quad (2)$$

calculated as the quotient of the number of observations “Sp” and the number of procedures in the analyzed audit  $P_x$ ;

- ◆ procedure score by the number of areas for improvement:

$$K_{Od} = Od / P_x \cdot 10 \quad (3)$$

calculated as the quotient of the number of areas for improvement “Od” and the number of procedures in the analyzed audit  $P_x$ ;

(due to the low numbers of the aforementioned score, to facilitate their analysis they are multiplied by 10);

- ◆ overall procedure score:

$$K_O = 3 \cdot K_N + 2 \cdot K_{Sp} + 0,1 \cdot K_{Od} \quad (4)$$

calculated as the sum of the number of non-conformances, observations and areas for improvement in the analyzed audit, taking the relevant weights into account; (the weights assigned to non-conformances, observations and areas for improvement in the overall score vary depending on their impact on the functioning of the integrated management system);

- ◆ overall annual branch score:

$$K_{Oo} = \sum K_O / A_x \quad (5)$$

calculated as the quotient of the sum of audit scores and the number of audits conducted in a year (average annual audit score).

The score system devised in such a way should be interpreted as follows: the lower the score of the integrated management system, the more effective the system – a lower score means a lower number of non-conformances, observations and areas for improvement.

After entering the data concerning the number of procedures, audited organizational units, non-conformances, observations and areas for improvement to the “Branch Sheet”, all scores are calculated automatically in line with the set mathematical formulas.

Figures 2–5 present model calculations of IMS functioning scores in a mine which is a branch of a mining company. These cover the period from 2007 to 2015, in which the audits of the management systems of this mine were carried out based on the procedures specified in the relevant standards – the non-conformances, observations and areas for improvement were classified in reports in accordance with the clauses of the relevant standards.

Figures 2–4 present a breakdown of individual audits and the scores calculated based on the number of non-conformances, observations and areas for improvement in the 2007–2015 period (in the case of areas for improvement the presented data refer to 2007–2008 only, because no such area was indicated later on).

Figure 5 presents overall scores of the effectiveness of the functioning of the integrated management system in the analyzed mining company branch in the individual years of the 2007–2015 period.

7 audits concerning 61 procedures were conducted in 2007. A total of 66 non-conformances were revealed, 150 observations were made and 37 areas for improvement were indicated. The annual score was **101.01**.

7 audits concerning 69 procedures were conducted in 2008. A total of 43 non-conformances were revealed, 104 observations were made and 21 areas for improvement were indicated. The annual score was **52.30**.

6 audits concerning 34 procedures were conducted in 2009. 17 non-conformances were revealed and 32 observations were made. No areas for improvement were indicated (this state of affairs remained true until 2015). The annual score was **80.70**.



Audit number in a year	Number of procedures	Number of organisational units	Number of non-conformances	Area													Score by non-conformances
				Standard 9001 - QUALITY - document control	Standard 9001 - QUALITY - record control	Standard 9001 - QUALITY - awareness	standard 9001 - QUALITY - legal requirements	Standard 9001 - QUALITY - operational control	Standard 9001 - QUALITY - requirements for products	Standard 9001 - QUALITY - communication	Standard 18001 - OHS - training	Standard 18001 - OHS - preventing workplace accidents	Standard 18001 - OHS - occupational risk management	Standard 18001 - OHS - significant risks	Standard 18001 - OHS - control of monitoring & measuring devices	Standard 18001 - OHS - hazard identification	
<b>2007</b>																	
1	9	21	1														1.11
2	4	6	11	*		*	*			*							27.50
3	5	8	6		*				*								12.00
4	12	29	13		*	*	*				*	*					10.83
5	11	18	20		*	*	*				*	*		*			18.18
6	6	12	12		*	*		*			*			*			20.00
7	14	26	3	*	*												2.14
<b>2008</b>																	
1	9	17	2		*											*	2.22
2	9	17	0														0.00
3	9	17	19	*	*			*		*	*		*			*	21.11
4	10	19	9	*	*					*							9.00
5	8	13	2	*	*						*						2.50
6	18	34	7	*	*			*			*					*	3.89
7	6	11	4	*	*			*		*						*	6.67
<b>2009</b>																	
1	9	27	0														0.00
2	8	24	0														0.00
3	1	1	5	*	*					*	*		*				50.00
4	6	30	1											*		*	1.67
5	9	25	7	*	*			*						*	*	*	7.78
6	1	4	4	*	*			*						*	*	*	4.00
<b>2010</b>																	
1	9	29	1							*							1.11
2	12	25	1		*												0.83
3	4	2	0														0.00
4	3	1	0														0.00
5	3	1	0														0.00
<b>2011</b>																	
1	8	30	1		*												1.25
2	11	31	0														0.00
3	4	2	1	*													2.50
4	4	2	2	*	*					*							5.00
<b>2012</b>																	
1	9	23	2	*											*		2.22
2	9	23	0														0.00
3	3	4	0														0.00
4	3	4	0														0.00
5	4	2	0														0.00
<b>2013</b>																	
1	10	22	0														0.00
2	14	21	0														0.00
3	4	8	2	*	*												5.00
<b>2014</b>																	
1	7	17	19	*	*	*				*	*				*	*	27.14
2	7	17	13	*	*	*		*		*	*				*	*	18.57
3	4	2	4	*	*				*				*				10.00
4	4	2	1													*	2.50
5	5	20	0														0.00
<b>2015</b>																	
1	6	16	8	*	*								*				13.33
2	6	24	4										*				6.67
3	4	4	13	*	*		*		*	*				*			32.50
4	5	3	1			*											2.00

Fig. 2. Scoring the implementation of management system procedures by the number of non-conformances revealed in the audits conducted in a model branch of a mining company from 2007 to 2015

Source: own study

Rys. 2. Ocena realizacji procedur systemów zarządzania według liczby niezgodności ujawnionych w audytach przeprowadzonych w przykładowym oddziale przedsiębiorstwa górniczego w latach 2007–2015

Audit number in a year	Number of procedures	Number of organisational units	Number of observations	Area														Score by observations
				Standard 9001 - QUALITY - document control	Standard 9001 - QUALITY - record control	Standard 9001 - QUALITY - awareness	Standard 9001 - QUALITY - legal requirements	Standard 9001 - QUALITY - operational control	Standard 9001 - QUALITY - requirements for products	Standard 9001 - QUALITY - communication	Standard 18001 - OHS - training	Standard 18001 - OHS - preventing workplace accidents	Standard 18001 - OHS - occupational risk management	Standard 18001 - OHS - significant risks	Standard 18001 - OHS - control of monitoring & measuring devices	Standard 18001 - OHS - hazard identification	Standard 18001 - OHS - prevention, preparedness and response to workplace accidents and major accidents	
<b>2007</b>																		
1	9	21	10	x	x													11.11
2	4	6	39	x	x					x	x							97.50
3	5	8	7	x	x													14.00
4	12	29	33	x	x			x										27.50
5	11	18	24	x	x			x						x				21.82
6	6	12	16	x	x					x								16.67
7	14	26	21	x	x					x								15.00
<b>2008</b>																		
1	9	17	4	x	x													4.44
2	9	17	7	x	x			x										7.78
3	9	17	28	x	x					x	x							31.11
4	10	19	42	x	x					x	x							42.00
5	8	13	9	x	x									x				11.25
6	18	34	6	x	x													3.33
7	6	11	8	x	x													13.33
<b>2009</b>																		
1	9	27	8	x	x													8.89
2	8	24	9	x	x													11.25
3	1	1	4															40.00
4	6	30	5	x	x													8.33
5	9	25	4	x	x													4.44
6	1	4	2							x								2.00
<b>2010</b>																		
1	9	29	9	x	x													10.00
2	12	25	1															0.83
3	4	2	4	x	x													10.00
4	3	1	2	x	x													6.67
5	3	1	1															3.33
<b>2011</b>																		
1	8	30	4															5.00
2	11	31	6															5.45
3	4	2	1															2.50
4	4	2	2															5.00
<b>2012</b>																		
1	9	23	0															0.00
2	9	23	1	x														1.11
3	3	4	4	x	x													13.33
4	3	4	1															3.33
5	4	2	4	x	x													10.00
<b>2013</b>																		
1	10	22	3	x	x													3.00
2	14	21	1	x														0.71
3	4	8	0															0.00
<b>2014</b>																		
1	7	17	0															0.00
2	7	17	0															0.00
3	4	2	0															0.00
4	4	2	0															0.00
5	5	20	1															2.00
<b>2015</b>																		
1	6	16	0															0.00
2	6	24	0															0.00
3	4	4	0															0.00
4	5	3	0															0.00

Fig. 3. Scoring the implementation of management system procedures by the number of observations in audits conducted in a model branch of a mining company from 2007 to 2015  
 Source: own study

Rys. 3. Ocena realizacji procedur systemów zarządzania według liczby spostrzeżeń w audytach przeprowadzonych w przykładowym oddziale przedsiębiorstwa górniczego w latach 2007–2015

Audit number in a year	Number of procedures	Number of organisational units	Number of areas for improvement	Area														Score by areas for improvement	
				Standard 9001 - QUALITY - document control	Standard 9001 - QUALITY - record control	Standard 9001 - QUALITY - awareness	standard 9001 - QUALITY - legal requirements	Standard 9001 - QUALITY - operational control	Standard 9001 - QUALITY - requirements for products	Standard 9001 - QUALITY - communication	Standard 18001 - OHS - training	Standard 18001 - OHS - preventing workplace accidents	Standard 18001 - OHS - occupational risk management	Standard 18001 - OHS - significant risks	Standard 18001 - OHS - control of monitoring & measuring devices	Standard 18001 - OHS - hazard identification	Standard 18001 - OHS - prevention, preparedness and response to workplace accidents and major accidents		Standard 14001 - ENVIRONMENT - hazardous waste - instruction
<b>2007</b>																			
1	9	21	0																0.00
2	4	6	4	x		x	x												10.00
3	5	8	3		x														6.00
4	12	29	18		x		x												15.00
5	11	18	7		x		x												6.36
6	6	12	5		x			x											8.33
7	14	26	0																0.00
<b>2008</b>																			
1	9	17	0																0.00
2	9	17	0																0.00
3	9	17	0																0.00
4	10	19	1																1.00
5	8	13	1	x															1.25
6	18	34	0																0.00
7	6	11	19	x	x		x												31.67

Fig. 4. Scoring the implementation of management system procedures by the number of areas for improvement revealed in audits conducted in a model branch of a mining company from 2007 to 2015

Source: own study

Rys. 4. Ocena realizacji procedur systemów zarządzania według liczby obszarów do doskonalenia ujawnionych w audytach przeprowadzonych w przykładowym oddziale przedsiębiorstwa górniczego w latach 2007–2015

5 audits concerning 31 procedures were conducted in 2010. A marked improvement in the functioning of the IMS when compared with the previous years could be noted with only two non-conformances and 17 observations. The annual score was **13.50**.

In 2011, 4 non-conformances were revealed and 13 observations were made within 4 audits covering 27 procedures. The annual score was **15.54**.

5 audits, during which 28 procedures were controlled, were conducted in 2012. Two non-conformances were revealed and 10 observations were made, and the annual score was **12.45**.

Only 3 audits, covering 28 procedures, as in the year before, were conducted in 2013. Two non-conformances were revealed and only 4 observations were made, thanks to which the annual score was **7.48**, and was the best throughout the entire analyzed period.

On the other hand, the audits conducted in two subsequent years demonstrated a significant deterioration in this regard. As many as 37 non-conformances were revealed and one observation was made in 2014 in five audits covering a comparable number of controlled procedures (27). The annual score was **35.73**.

In the last analyzed year, 2015, 26 non-conformances were revealed in four audits covering 21 procedures. This resulted in another increase in the annual score – to **40.88**.



Audit number in a year	Number of procedures	Number of organisational units	Number of non-conformances	Number of observations	Number of areas for improvement	Score by non-conformances	Score by observations	Score by areas for improvement	Audit score	Annual score
<b>2007</b>										
1	9	21	1	10	0	1.11	11.11	0.00	25.55	<b>101.01</b>
2	4	6	11	39	4	27.50	97.50	10.00	278.50	
3	5	8	6	7	3	12.00	14.00	60.00	64.60	
4	12	29	13	33	18	10.83	27.50	15.00	88.99	
5	11	18	20	24	7	18.18	21.82	6.36	98.82	
6	6	12	12	16	5	20.00	16.67	8.33	114.17	
7	14	26	3	21	0	2.14	15.00	0.00	36.43	
<b>2008</b>										
1	9	17	2	4	0	2.22	4.44	0.00	15.56	<b>52.30</b>
2	9	17	0	7	0	0.00	7.78	0.00	15.56	
3	9	17	19	28	0	21.11	31.11	0.00	125.56	
4	10	19	9	42	1	9.00	42.00	1.00	111.10	
5	8	13	2	9	1	2.50	11.25	12.50	30.13	
6	18	34	7	6	0	3.89	3.33	0.00	18.33	
7	6	11	4	8	19	6.67	13.33	31.67	49.83	
<b>2009</b>										
1	9	27	0	8	0	0.00	8.89	0.00	17.78	<b>80.70</b>
2	8	24	0	9	0	0.00	11.25	0.00	22.50	
3	1	1	5	4	0	50.00	40.00	0.00	230.00	
4	6	30	1	5	0	1.67	8.33	0.00	21.67	
5	9	25	7	4	0	7.78	4.44	0.00	32.22	
6	1	4	4	2	0	4.00	2.00	0.00	160.00	
<b>2010</b>										
1	9	29	1	9	0	1.11	10.00	0.00	23.33	<b>13.50</b>
2	12	25	1	1	0	0.83	0.83	0.00	4.17	
3	4	2	0	4	0	0.00	10.00	0.00	20.00	
4	3	1	0	2	0	0.00	6.67	0.00	13.33	
5	3	1	0	1	0	0.00	3.33	0.00	6.67	
<b>2011</b>										
1	8	30	1	4	0	1.25	5.00	0.00	13.75	<b>15.54</b>
2	11	31	0	6	0	0.00	5.45	0.00	10.91	
3	4	2	1	1	0	2.50	2.50	0.00	12.50	
4	4	2	2	2	0	5.00	5.00	0.00	25.00	
<b>2012</b>										
1	9	23	2	0	0	2.22	0.00	0.00	6.67	<b>12.45</b>
2	9	23	0	1	0	0.00	1.11	0.00	2.22	
3	3	4	0	4	0	0.00	13.33	0.00	26.67	
4	3	4	0	1	0	0.00	3.33	0.00	6.67	
5	4	2	0	4	0	0.00	10.00	0.00	20.00	
<b>2013</b>										
1	10	22	0	3	0	0.00	3.00	0.00	6.00	<b>7.48</b>
2	14	21	0	1	0	0.00	0.71	0.00	1.43	
3	4	8	2	0	0	5.00	0.00	0.00	15.00	
<b>2014</b>										
1	7	17	19	0	0	27.14	0.00	0.00	81.43	<b>35.73</b>
2	7	17	13	0	0	18.57	0.00	0.00	55.71	
3	4	2	4	0	0	10.00	0.00	0.00	30.00	
4	4	2	1	0	0	2.50	0.00	0.00	7.50	
5	5	20	0	1	0	0.00	2.00	0.00	4.00	
<b>2015</b>										
1	6	16	8	0	0	13.33	0.00	0.00	40.00	<b>40.88</b>
2	6	24	4	0	0	6.67	0.00	0.00	20.00	
3	4	4	13	0	0	32.50	0.00	0.00	97.50	
4	5	3	1	0	0	2.00	0.00	0.00	6.00	

Fig. 5. Scoring the effectiveness of the functioning of the integrated management system in a model branch of a mining company from 2007 to 2015  
Source: own study

Rys. 5. Ocena skuteczności funkcjonowania zintegrowanego systemu zarządzania w przykładowym oddziale przedsiębiorstwa górniczego w latach 2007–2015

As indicated by the presented model, the proposed methodology fulfils its purpose well, providing results which evaluated the functioning of management systems in a measurable way. The obtained score depends on the number of non-conformances revealed, observations made and areas for improvement identified. It is worth noting that it also depends, to a large extent, on the number of non-conformances revealed in the audits, related to the number of procedures.

The presented procedure will be of use for the management boards and managers of enterprises, as well as IMS specialists, as it facilitates easy comparisons concerning:

- ◆ the functioning of the management systems in the branch (mine) in a given period of time,
- ◆ the comparison of the functionality of the management systems in individual branches (Nowak 2018).

## Summary

The conducted analyses of the integrated management system documentation in individual mining companies revealed that the functioning of the systems and process has been, so far, evaluated in a descriptive way. The audit reports indicated that the conducted control revealed a specific number of non-conformances, observations or areas for improvement. However, no numerical measure is used which would allow a specific scoring of the functioning of the integrated management system or the comparison of its functioning between the individual branches of the enterprise. Based on the functions of the Excel program, the devised methodology and developed ANG algorithm, can be implemented in a relatively easy and quick way.

Furthermore, it is irrelevant whether an approach based on the standards in force or a process approach is applied with regard to the management systems implemented in the enterprise. A proposal for the procedure which can be applied in the latter case will be presented in the next part of the article.

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**THE METHOD OF IMPROVING THE FUNCTIONING  
OF AN INTEGRATED MANAGEMENT SYSTEM IN A MINING ENTERPRISE**

**Key words**

mining enterprises, integrated management system, business processes

**Abstract**

In order to fully adapt to market requirements, mining enterprises in recent years have implemented standardized systems for quality, safety and health at work and environmental management. The standards for individual systems define the requirements of applying specific procedures and actions to implement the adopted policy aimed at achieving the assumed goals. The combination of business procedures and practices is more effective in the case of their integration than the activities carried out under separate systems. They then function under the name of an integrated management system (IMS). Properly implemented IMSs most often contributes to a more harmonious functioning of the enterprise and the elimination of recurring activities in the areas concerning individual systems, and thus to the optimization of costs related to their implementation and maintenance. Improving the operational efficiency of the mining enterprise and mines included in it, while maintaining the requirements of work safety and environmental protection. In the conditions of a market economy, improving the efficiency of functioning and providing sources of business financing is a key necessity for mining enterprise (Bąk 2007, 2008). Mines need to be properly managed to survive. The key problem is the design and implementation of an efficient management system and its continuous improvement based on the adequacy of system solutions. This is an answer to the question whether the management system of a mining enterprise (mine) corresponds to its real needs in the process of achieving objectives.

Improvement of management systems must be based on an appropriate diagnosis. The aim of the article is to present the original solution, which is a tool for improving the integrated management system in Polish mining enterprises.

**METODYKA OCENY FUNKCJONOWANIA ZINTEGROWANEGO SYSTEMU ZARZĄDZANIA  
W PRZEDSIĘBIORSTWIE GÓRNICZYM JAKO NARZĘDZIE JEGO DOSKONALENIA**

**Słowa kluczowe**

przedsiębiorstwa górnicze, zintegrowany system zarządzania, procesy biznesowe

**Streszczenie**

Chcąc w pełni dostosować się do wymogów rynku, przedsiębiorstwa górnicze w ostatnich latach wdrożyły do stosowania znormalizowane systemy zarządzania jakością, bezpieczeństwem i higieną pracy oraz środowiskowego. Normy dotyczące poszczególnych systemów definiują wymogi stosowania określonych procedur i działań, służących wdrażaniu przyjętej polityki. Połączenie procedur i praktyk działania stosowanych w przedsiębiorstwie jest bardziej skuteczne w przypadku ich scaleń, niż działań realizowanych w ramach oddzielnych systemów. Funkcjonują one wtedy pod nazwą zintegrowanego systemu zarządzania (ZSZ). Prawidłowo wdrożony ZSZ przyczynia się najczęściej do bardziej harmonijnego funkcjonowania przedsiębiorstwa oraz eliminacji powtarzających się działań w obszarach dotyczących poszczególnych systemów, a przez to do optymalizacji kosztów związanych z ich wdrażaniem i utrzymywaniem. Poprawia sprawności funkcjonowania przedsiębiorstwa górniczego i kopalń wchodzących w jego skład, przy zachowaniu wymogów bezpieczeństwa pracy i ochrony środowiska. W warunkach gospodarki rynkowej podnoszenie efektywności funkcjonowania i zapewnienie źródeł finansowania działalności jest dla przedsiębiorstw górniczych pierwszoplanową koniecznością (Bąk 2007, 2008). Kluczowym problemem jest zaprojektowanie i wdrożenie sprawnego systemu zarządzania oraz jego ciągłe doskonalenie, oparte na adekwatności rozwiązań systemowych. Chodzi o odpowiedź na pytanie, czy system zarządzania przedsiębiorstwem górniczym (kopalnią) odpowiada jego rzeczywistym potrzebom w procesie realizacji celów. Doskonalenie systemów zarządzania musi być oparte na odpowiedniej diagnozie. Celem artykułu jest przedstawienie autorskiego rozwiązania, które stanowi narzędzie doskonalenia zintegrowanego systemu zarządzania w polskich przedsiębiorstwach górniczych.