



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research
Vol. 09, Issue, 03, pp.26119-26125, March, 2019



ORIGINAL RESEARCH ARTICLE

OPEN ACCESS

ANALYSING THE STATE OF IMPLEMENTATION OF AN INTEGRATED MANAGEMENT SYSTEM IN A MINING COMPANY IN POLAND

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ARTICLE INFO

Article History:

Received 09th December, 2018
Received in revised form
06th January, 2019
Accepted 03rd February, 2019
Published online 29th March, 2019

Key Words:

Company management, Company policy, Integrated management system, Mining company, Statistical methods

ABSTRACT

The current state of hard coal mining in Poland is the result of many years of technological, organizational and also economic and social changes. Constantly, often in a dynamic manner, changing environmental conditions, both external and internal hard coal mines, require adaptation (improvement) measures. Their goal is, above all, gaining a competitive advantage, not only on the domestic market, but also on the global market for many years. In addition to technological and technical changes that are associated with the improvement of the mining production process, organizational innovations play an extremely important role. The development of management methods entails the emergence of new organizational solutions. For several years, quality management systems, occupational health and safety as well as safety systems have been implemented in Polish mining enterprises. In order for the implementation of the integrated management system to bring the expected results, it is first and foremost necessary that the introduced changes be accepted by the management and the crew of the enterprises. This issue is precisely devoted to the considerations contained in this article.

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Citation: Patrycja Bąk. 2019. "Analysing the state of implementation of an integrated management system in a mining company in Poland", *International Journal of Development Research*, 09, (03), 26119-26125.

INTRODUCTION

Despite the continuous decrease in the importance of coal as an energy carrier, hard coal mining in Poland is (and will be for many years to come) a sector of strategic importance in terms of ensuring the state's energy security. For this and other reasons, quality, occupational health and safety, and environmental safety management systems have been implemented in Polish mining companies for several years now, and have been usually integrated into a single integrated management system (IMS). By definition, an IMS combines processes, procedures and practices applied in a company in order to implement its policy, which may be more effective as a means to achieving policy objectives than relying on separate systems. Adopting an IMS by establishing and pursuing a uniform and specified policy makes it possible to effectively and simultaneously manage many subsystems. Company policy shall be understood here as precisely determined business intentions and direction.

Such policy specifies the objectives of the company stemming from its mission (the purpose of existence) and vision (aspirations, what it would like to become). According to H. Wirth "formulating the objectives of an enterprise and the ways of achieving them forms the core of its strategy" (Wirth, 2015) And another paper (Krzyżanowski, 1993), defined the company's purpose as follows: "the purpose of the enterprise is defined, in objective and subjective terms, as the future desired state or result of the enterprise's operation, possible and intended within a period of time covered by a long-term or short-term action plan". By adopting such integrated management systems, along with the associated process approach to company management, mining companies (mines) often need to undergo major changes in the manner of their operation. Most importantly, in order for the implementation of an IMS to bring the expected results, it is necessary for the introduced changes to be accepted by the management and the staff. And this topic will be analysed in greater detail in this article.

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The reasons for using an integrated management system in a mining company: The primary objective of implementing integrated management systems in mining companies is the need for developing methods, based on scientific foundations (management science), to continuously improve their

effectiveness. An IMS usually covers three management systems related, respectively, to quality, occupational health and safety, and environmental safety. Each of these has its own areas (concerning specific processes, procedures and activities) and scopes of responsibility.

All the scopes of the IMS are based on the standards used for the certification of the entity which has implemented the system. Integrating three systems into one ensures the application of common procedures required by the standards. These include procedures for (Nowak, 2018).

- Document control,
- Identification of, and access, to current legal and other requirements related to environmental protection and occupational health and safety, and to regulations related to the system itself,
- Training needs, awareness and qualifications,
- Internal and external communication,
- Response to emergencies and workplace accidents,
- Dealing with nonconformities and observations,
- Planning and conducting audits of individual systems.

The primary objective of the IMS implemented in a mining company should be to maintain its position as a supplier of coal with specific quality parameters, which remain stable over time, to specific customers, who, due to the above and other factors (e.g. timeliness of deliveries and prices) will make up a group of its regular customers (Załucki, 2004). The applicable standards recommend the use of the so-called process approach in the implementation of individual management systems as well as the IMS.

In the most general terms, it is “a concept of designing and improving operating systems, in which the improved system is presented as a set of the following components: system function, input, output, sequence of steps to transform inputs into outputs (process), system environment, equipment and human resources.” (Adamska, 2004), (Olkiewicz, 2012). Mining companies implement a production process understood as activities aimed at obtaining commercial coal with appropriate quality parameters. Its structure is defined as „a system of sub-processes, activities and engineering operations carried out in time and space by human teams using technical resources” (Bijańska, 2006). For example, the processes carried out in a mining company can include: surveying and geology, planning and design of coal production, raw coal mining, commercial coal production, management of underground and surface infrastructure, work safety supervision, planning of and making purchases, customer acquisition and service, environmental protection, and financial management.

Acceptance by employees as the foundation for a successful implementation of an ims in a company: The implementation of changes to the functioning of any company often encounters various barriers, including technical, technological, financial, organisational, and often psychological. The last are usually due to employees’ being reluctant to introduce them. Company management should bear this fact in mind, as such resistance may pose a significant threat to the successful implementation of the system and to the expected benefits. The causes of resistance to change can be classified in different ways. They were identified and briefly characterised in [3] (Table 1).

Table 1. Sources of resistance to introduced changes

Source	Description
Invariability	Lack of understanding of the character of the change
Ignorance	Management or persons implementing changes disregarding employees’ attitudes, needs and beliefs
Comparison	The proposed solutions are not accepted and other changes appear more suitable
Disbelief	Lack of faith in the proposed solutions
Loss	The changes may result in unacceptable personal costs
Insufficiency	The expected benefits are insufficient
Disturbance	The threat of destroying existing business or personal relations
Reduction of power	Reduction of influence and prestige
Contamination	Aversion to or even disgust with new practices and values
Restraint	Low inclination to change
Lack of trust	Uncertainty as to the motives of the changes or the persons introducing them
Alienation	Poor support for new values or much greater interest in another direction of change
Frustration	Changes decrease career opportunities
Intolerance	Fear of the new situation, fear of feeling incompetent

Source: [3].

As the lack of acceptance and resistance to change can completely undermine the expected benefits, it is very important for the company’s management to identify their sources and to develop effective ways of counteracting them (Woźniak, 2005). An attempt at identifying such sources was made in (Nowak, 2018). It was based on examining how employees perceived the effectiveness of the implementation and operation of management systems and the integrated management system in a large mining company.

The steps and results of research into the perception of the effects of IMS implementation in a mining company in Poland

The research consisted in literature studies followed by obtaining expert opinions using a survey. The conducted literature analysis indicated the lack of previous studies into the perception of the effectiveness of the operation of integrated management systems in mining companies. Therefore, an attempt was made to make such an assessment on the basis of the survey and interviews with employees and experts, i.e. management system specialists in that company and management systems auditors. The necessary sample size was calculated on the basis of statistical methods for determining the minimum number of persons who should take part in the survey. Since all employees of the company – in blue- and white-collar positions, employed in underground and surface divisions – were familiarised with the principles of implementation and operation of the integrated management system, it was assumed that the expected knowledge of IMS principles, processes and procedures (*p*) could be assumed at 90%. The level of confidence Z_{α} , i.e. the level of confidence that the findings will be applicable to the entire population – all employees of the enterprise, was assumed at 95%. The value obtained for the 95-percent level of confidence equals 1.64. The company employs 43,000 people. The standard error of estimate (*d*), which refers to a maximum discrepancy of the result from the actual value in a population, was assumed at 5%. Based on these assumptions, the minimum number of respondents (the minimum sample size) was calculated using formula (1) [7]:

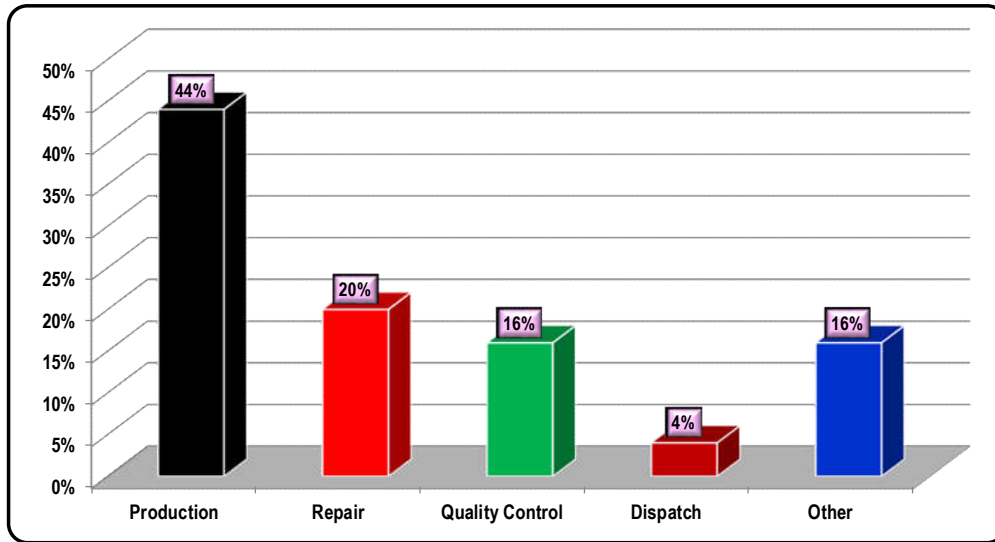
$$n = Z_{\alpha}^2 \frac{p(1-p)}{d^2} \dots\dots\dots(1)$$

The minimum sample size was obtained by substituting data in formula (1):

$$n = 1.64^2 \frac{0.9(1-0.9)}{0.05^2} = 96.83$$

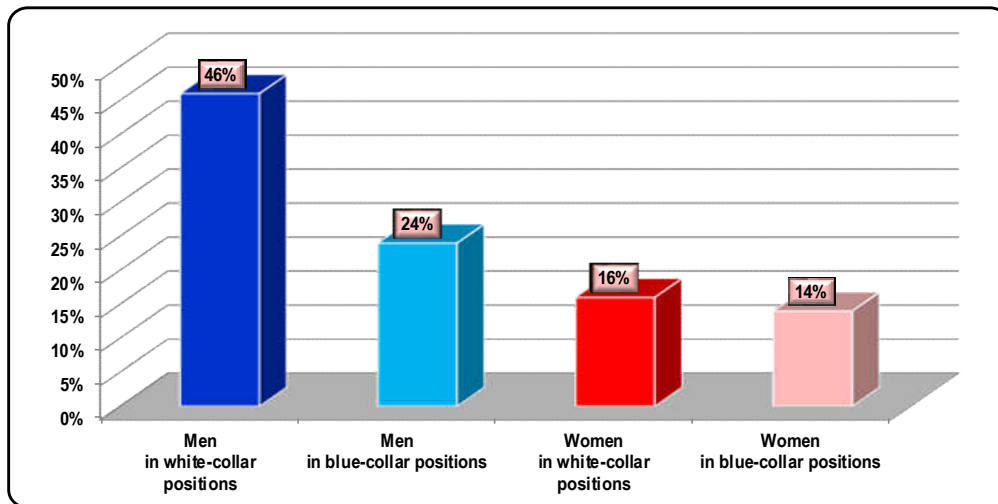
The minimum number of respondents participating in the surveys should equal 97 people – the questionnaires were completed by one hundred people. The respondents were employees of hard coal mines (Chart 1). The largest group among the respondents were men (70%), 46% of whom worked in white-collar positions and 24% in blue-collar positions. As regards women, 16% held white-collar positions and 14% blue-collar positions (Chart 2).

- II. The quality management system hinders and increases the time necessary for completing the processes in the company.
- III. The quality management system increases bureaucracy.
- IV. The quality management system improves communication among employees.
- III. The appropriate implementation of the quality management system improves work efficiency.
- IV. The safety management system improves communication among employees.



Source: Work based on the results of the conducted studies.

Chart 1. Number of respondents from individual departments by percentage



Source: Work based on the results of the conducted studies.

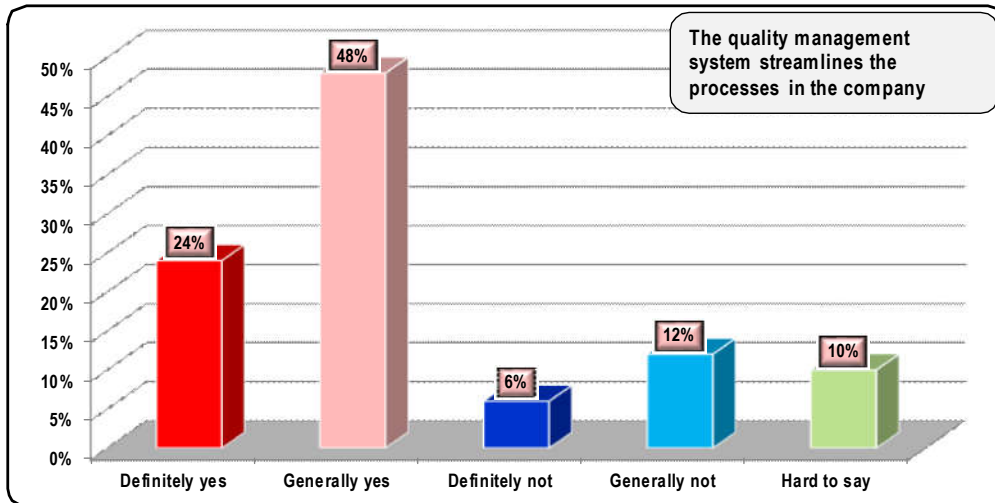
Chart 2. Numbers of surveyed men and women by percentage

The questionnaire consisted of 25 questions. The survey was conducted anonymously among a previously selected group of company’s employees. The main part of the questionnaire consisted of 21 questions concerning various aspects related to the operation of the IMS in a company. The most important issues related to the system and its impact on employees were presented in Question 26, in which respondents were asked to indicate whether they agreed with the eight statements listed below:

- I. The quality management system streamlines the processes in the company.

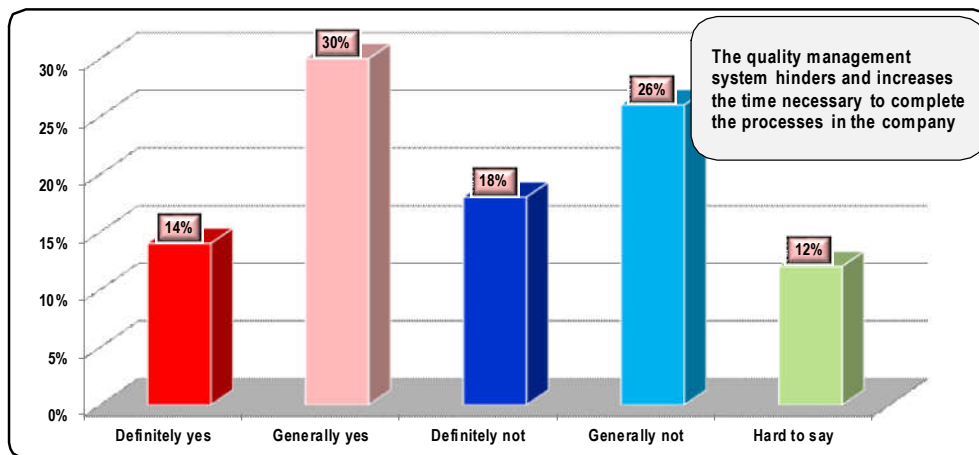
- VII. I feel safer thanks to the implemented safety management system.
- VIII. The environment is cleaner thanks to the implemented environmental management system.

Statement 1 - the largest group of respondents, i.e. as many as 48%, believed that the quality management system generally facilitated the implementation of processes in the company, and 24% of them stated that it definitely facilitated it. 12% of respondents thought that it generally did not facilitate it, and 6% that it definitely did not facilitate it. 10% found it difficult to express their opinion on the issue at hand (Chart 3).



Source: Work based on the results of the conducted studies.

Chart 3. Statement 1 – Distribution of responders’ answers by percentage



Source: Work based on the results of the conducted studies.

Chart 4. Statement 2 – the percentage distribution of the responders’ answers

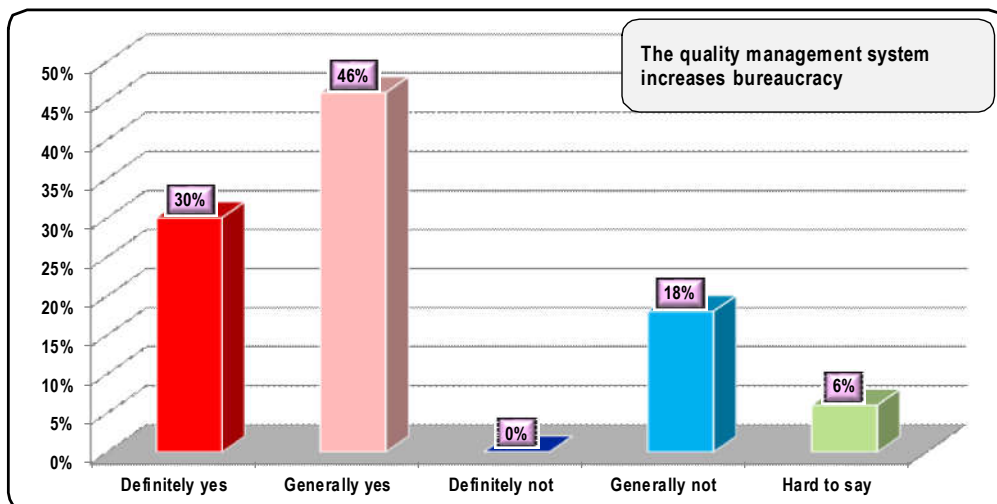


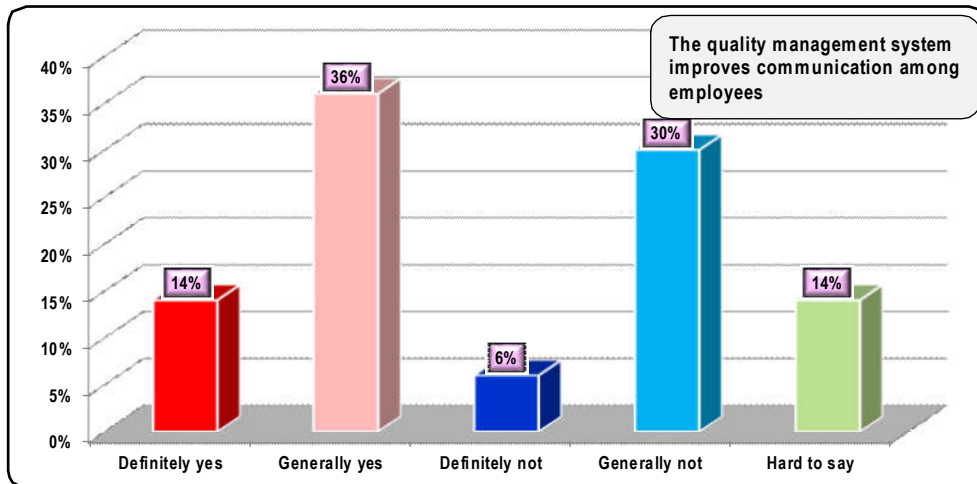
Chart 5. Statement 3 – Distribution of the responders’ answers by percentage

Statement 2 - 30% of the respondents believed that the quality management system generally hindered and increased the time necessary to complete the processes in the company, and 14% of them stated that it was definitely the case. 26% of respondents thought that it was generally not the case, and 18% that it is definitely was not the case.

12% found it hard to say whether the quality management system hindered and extended their working time within the procedures used in the company (Chart 4). Statement 3 – 46% of the respondents thought it was generally the case, and 30% that it definitely was the case (76% in total!), while 18% that it was generally not the case (with no employee stated that it

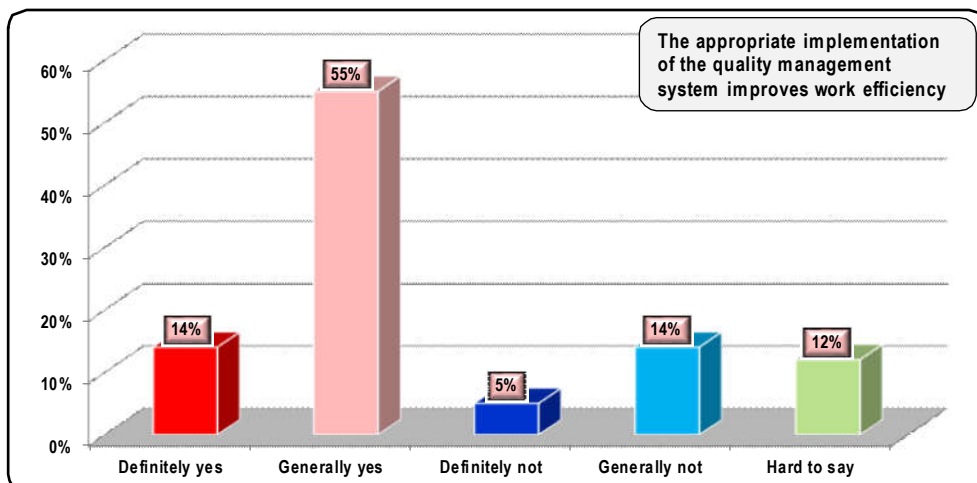
definitely did not result in increased bureaucracy). 6% could not specify their answer (Chart 5). Statement 4 – the impact of the quality management system on communication among employees: according to 36%, the system generally improved it, for 14% it definitely improved it, 30% stated that it generally had no impact, and 6% indicated that it definitely had no impact. 14% of the respondents could not specify their answer (Chart 6).

As regards Statement 5, the distribution of answers was as follows: Generally yes – 55%, Definitely yes – 14%, Generally not – 14%, Definitely not – 5%, Hard to say – 12% (Chart 7). As regards Statement 6, the respondents’ answers were as follows: Generally yes – 38%, Definitely yes – 12%, Generally not – 32%, Definitely not – 6%, Hard to say – 12% (Chart 8). For Statement 7, the respondents provided the following answers: 36% generally felt safer, 12% definitely felt safer,



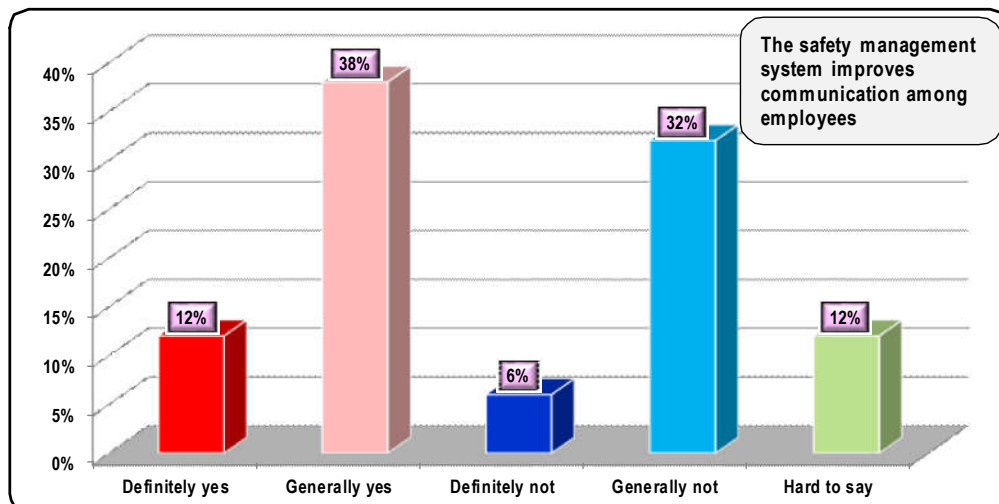
Source: Work based on the results of the conducted studies.

Chart 6. Statement 4 – Distribution of the responders’ answers by percentage



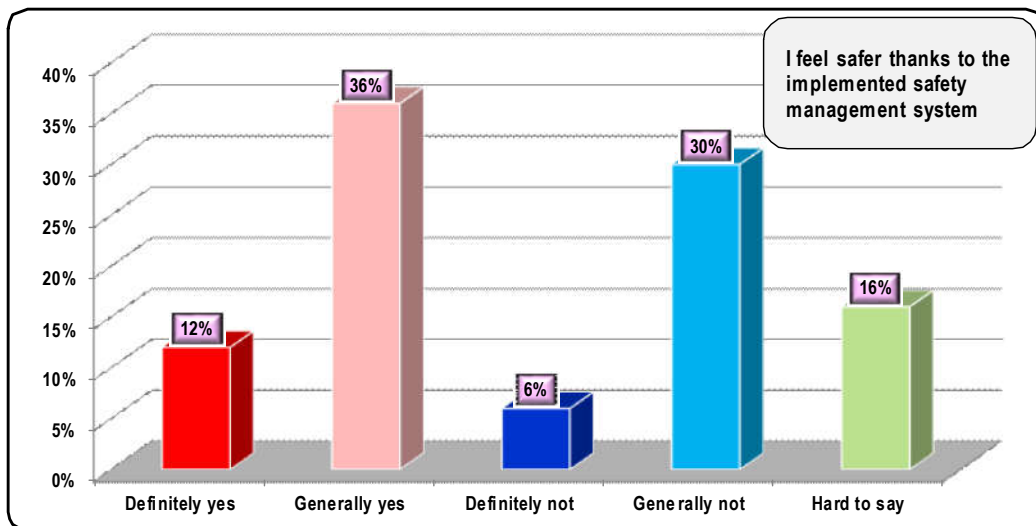
Source: Work based on the results of the conducted studies.

Chart 7. Statement 5 – Distribution of the responders’ answers by percentage



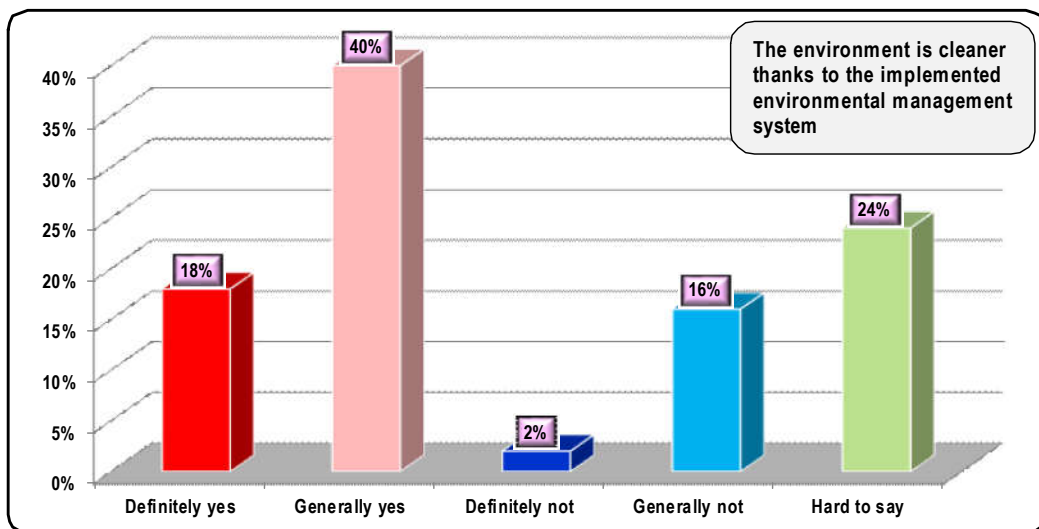
Source: Work based on the results of the conducted studies.

Chart 8. Statement 6 – Distribution of the responders’ answers by percentage



Source: Work based on the results of the conducted studies.

Chart 9. Statement 7 – Distribution of the responders' answers by percentage



Source: Work based on the results of the conducted studies.

Chart 10. Statement 8 – Distribution of the responders' answers by percentage

50% generally did not feel safer, and 6% definitely did not feel safer, while 16% could not express their opinions (Chart 9). For Statement 8, the respondents' answers were as follows: 40% of respondents answered Generally yes, 18% Definitely yes, 16% Generally not, and 2% Definitely not. As many as 24% found it difficult to express their opinion on this issue. In two questions included in the questionnaire the respondents were asked to express their opinions on the factors facilitating and hindering the implementation and application of the integrated management system in the company. The distribution of the obtained answers is presented in Figures 2 and 3 (it was possible to select more than one factor). Factors facilitating the operation of the IMS included (by percentage in descending order): awareness of employees – 74%, involvement of top-level management – 64%, clearly defined processes and procedures – 58%, reduced amount of system documentation – 48%, clearly set criteria and system requirements – 42%, appropriately funded processes – 40%, other – 4%. The following were most frequently mentioned as obstacles hindering the operation of the IMS in the company: excessive documentation – 62%, the system being out of sync with the situation of the company – 46%, not perceiving the system as a set of interacting and interrelated elements – 44%, employees not having the necessary knowledge – 42%,

employees being insufficiently prepared to work in the system – 34%, the top-level management not being involved enough – 22%, other – 4%.

Conclusion

1. Most importantly, the anonymous survey clearly showed that neither the rules for the practical application of the integrated management system (or its individual subsystems), nor its implementation in the company, meet with hostility or reluctance of the personnel. Therefore, it is quite probable that IMS implementation may bring about the expected benefits.
2. The surveyed employees were aware that the implemented and properly operating IMS would contribute to the effective planning and organisation of mining operations and other processes, the determination of objectives and tasks, and managing individual mines and the whole company. Their responses indicate that the claim that the application of the system necessitates coordination of activities of individual units, and also contributes to the explicit formulation of expectations towards the supervisory personnel and subordinate staff, has been accepted.

3. One could note that despite declaring at least a basic knowledge of the principles of the implemented processes, procedures and actions in management systems, respondents found it difficult to unambiguously specify their impact on the operation of the company and on their own work.
4. It is worrying that in their answers to Statement 3, as many as 76% of the respondents stated that the implementation of the quality management system increased bureaucracy and, importantly, not a single respondent strongly denied this statement. This opinion was also confirmed when the respondents were asked to indicate barriers hindering the functioning of management systems, with as many as 62% of responses indicating excessive bureaucracy.
5. Finally, the surveys indicated another important issue related to IMS implementation and application. The responses often pointed to the need for continued involvement of top-level management (company management boards and mine management) in this regard.

Acknowledgements

The paper presents results of research conducted in AGH University of Science and Technology no. 11.11.100.693.

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