https://doi.org/10.7494/miag.2021.1.545.50

ANETA NAPIERAJ
ALDONA URBANEK
MAREK BOROWSKI

Future competences in mining (based on surveys, evaluations and opinions on the project Sectoral Qualifications Framework for Mining)

One of the stages of work on the Sectoral Qualifications Framework for Mining (SQFM) was to verify its initial design as a result of quantitative research using questionnaires and qualitative research through in-depth interviews (IDI). Their main goal was to identify the opinions and attitudes of respondents related to the mining industry towards the implemented SQFM project. Both people working in mining plants and in other companies and units related to the mining sector were invited to take part in the project. The expected result of the conducted research was the collection of material allowing for the verification of the provisions in terms of the needs and expectations of employers as to the qualifications of the employed employees and the assessment of the legitimacy of the proposed solutions.

In designing the research, the use of qualitative and quantitative methods was assumed. This made it possible to triangulate the data – looking at the studied research problems from different perspectives, which was to influence the obtaining of empirical material allowing for the analysis of the discussed problems taking into account various points of view. As a result, the image of the needs in the area of increasing competences and the main deficits in the mining sector has crystallized.

Key words: *competences, qualifications, Polish Qualifications Framework, Sectoral Qualifications Framework for the Mining Sector*

1. INTRODUCTION

The development of the Sectoral Qualifications Framework for the Mining (SQFM) is one of the elements of the overall work to develop and implement the Integrated Qualifications System (IQS) in Poland.

The main idea behind the IQS is an understanding of qualifications as "a set of learning outcomes in the categories of knowledge, skills and social competence, acquired in formal education, non-formal education or through informal learning, in accordance with the requirements set for a given qualification, the achievement of which is assessed through validation and formally confirmed by an authorised awarding body" [1]. It is assumed here that a qualification confirms what a person has learned regardless of the manner in which such learning has been acquired.

In order to compare different qualifications included in the Integrated Qualifications System, the Polish Qualifications Framework (PQF) was developed [2]. Because it was referenced to the European Qualifications Framework [3], it is possible to easily compare qualifications awarded in Poland to those in other European countries.

The initial pilot work conducted in 2013–2014 showed that the Polish Qualifications Framework,

which is intended as a reference point for all qualifications awarded in Poland, does not always adequately reflect the specific nature of different sectors of the economy. Therefore, work was begun on developing so-called Sectoral Qualifications Frameworks (SQF), which by adapting to the needs of a given sector, as well as by using its characteristic terminology, can provide a bridge between the world of education and the labour market [4].

SQF was created in the following sectors: sports, tourism, construction, development services, telecommunications, trade, banking, IT, public health, chemical industry, fashion industry, The first four have been included in the Integrated Qualifications System, the next three have received a positive recommendation from the IQS Stakeholder Council and are at an advanced stage of inclusion.

2. STAGES OF PREPARATION OF SQFMS

The SQFMS was created in four basic design steps. Work began with the preparation of the preliminary SQFMS project (Step 1). Building on existing legislation [5–7] and the competency analysis in the mining sector [8], the framework concept, sector determinants and contexts were developed. Then, expert consultations (Step 2) were organized in specially appointed expert teams. The next step was to conduct a survey of the opinions of employees and stakeholders of the sector (Step 3). In the last step, the final SQFMS project was developed (Step 4).

The resulting document was published, inter alia, on the website of the Educational Research Institute [9].

3. RESEARCH OF SECTOR OPINION ON SQFM

After the initial SQFM draft was developed, the consultation process began. For this purpose, an extensive opinion poll was conducted among employees of the sector and its other stakeholders. This chapter describes the process and results of the research.

3.1. Aim of the study and issues investigated

The main objective of this study was to identify the opinions and attitudes of mining sector stakeholders towards the proposed SQFM being developed. People working in mining facilities as well as in other companies and entities associated with the mining sector were invited to participate in this study. Data from the study were anonymised.

The study methodology assumed conveying the project to the respondents in the form of a separate document. The expected result of the conducted study was to collect material that would allow the provisions of the proposed SQFM to be checked in terms of employers' needs and expectations regarding the qualifications of employees and to assess the validity of the proposed solutions.

The main research problems assessed were: competences, qualifications and level of knowledge of employees in the mining sector; knowledge of PQF, and SQFM in particular; the legibility of the project provisions and the effectiveness of the implementation of the SQFM provisions.

3.2. Research, methods, techniques and tools

The research design assumed the use of quantitative and qualitative methods [10–12]. This made it possible to look at the analysed research problems from different perspectives, which was to influence the obtaining of empirical material allowing for the analysis of the discussed problems taking into account various points of view.

The quantitative method was based on using the Internet survey technique. The tool used in this part of the study was an online survey placed on the www.ebadania.pl platform. The qualitative method was based on using the in-depth interview technique.

The construction of the tools was the result of discussions and consultations held among the experts. The tools were verified in a pilot study conducted on a sample of respondents with diverse socio-demographic and professional characteristics relevant to the research problem.

3.3. Selection of the study sample

The study applied a purposive sampling of the respondents. The main criterion for inclusion in the sample was employment in the mining sector. People working in various entities and institutions associated

with the mining industry were invited to take part in the quantitative research. Respondents with particularly broad and deep knowledge of the issues in question were invited to take part in the qualitative research – primarily due to the specificity of their professional duties and positions held (hereinafter referred to as experts).

3.4. Characteristics of the studied population

Part of the results of the quantitative research were prepared on the basis of responses from 105 participants on 150 questionnaires sent.

The number of years that the respondents had worked in the mining sector was quite varied (Fig. 1).

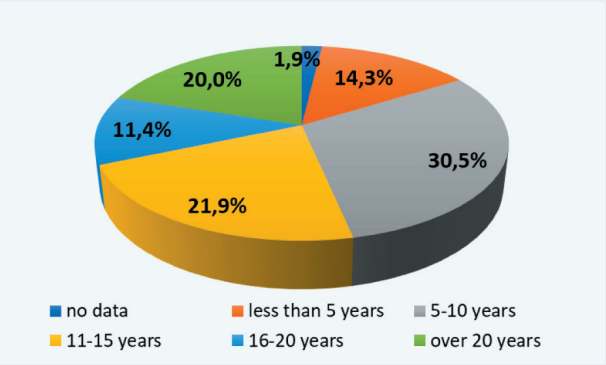

Fig. 1. Length of work in the mining sector

Less than one-third of the respondents declared that they had been working in this sector for 5 to 10 years, and every fifth respondent stated that their length of service was between 11 and 15 years; a similarly large category of respondents spoke of their experience of more than twenty years working in the mining sector. Less numerous were the categories indicating work tenure in the industry for less than 5 years (14.3%) and 16–20 years (11.4%).

Two-thirds of the respondents were persons employed directly by a mining company (mine). Also among the respondents was a large representation of persons working in a company or entity associated with the mining industry other than a mining company (Fig. 2).

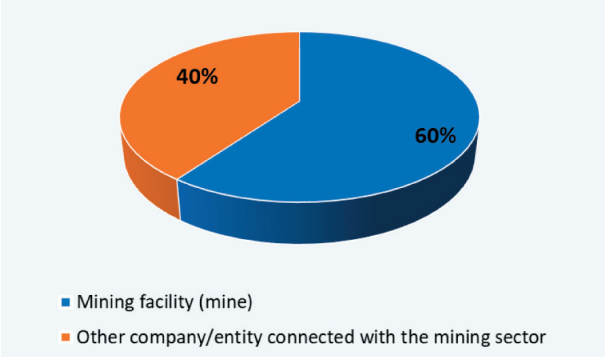

Fig. 2. Place of employment in the mining sector

Respondents were also asked about membership or work in various types of institutions associated with the mining industry. The data in Figure 3 show that almost half of the respondents declared membership or work in mining sector institutions/organisations/associations. Respondents much less frequently declared employment or membership in institutions performing supervisory and regulatory functions, activity in employers' organisations and associations, or work in universities and research institutes. The least frequent responses indicated employment or membership in entities associated with the mining sector in areas other than those indicated in the cafeteria of selections.

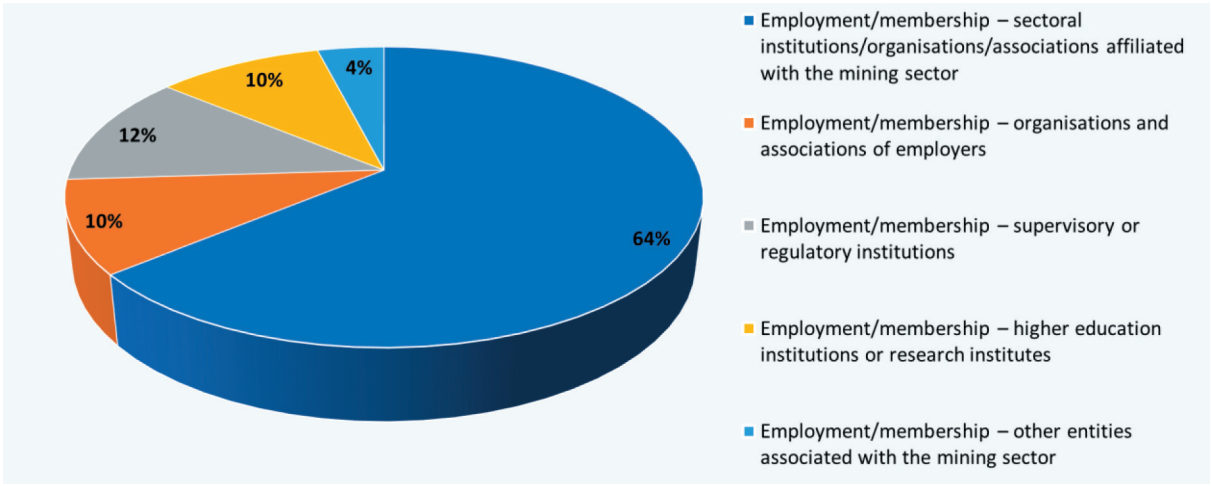

Fig. 3. Professional activity in the mining sector

A total of twenty respondents took part in the qualitative research. All those invited to the study took part in it. The group of experts included four women and sixteen men. The length of service in the mining sector declared by the respondents varied. As indicated by the data summarised in Figure 4, the most numerous were experts declaring employment in the sector for over 20 years. The respondents also included persons with relatively short work experience in the sector – less than five years.

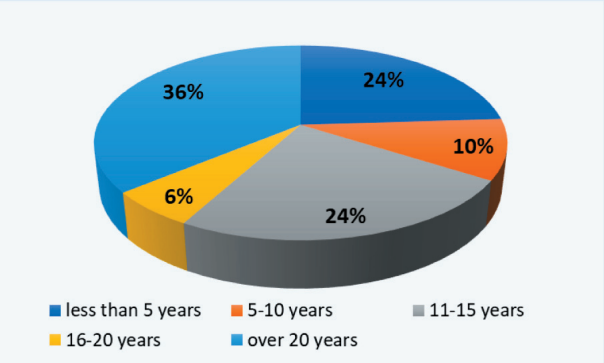

Fig. 4. Length of work in the mining sector – experts

Most of the surveyed experts were employed in companies and entities associated with the mining sector. Figure 5 presents the declared places of employment (several experts declared simultaneous employment in both types of entities listed).

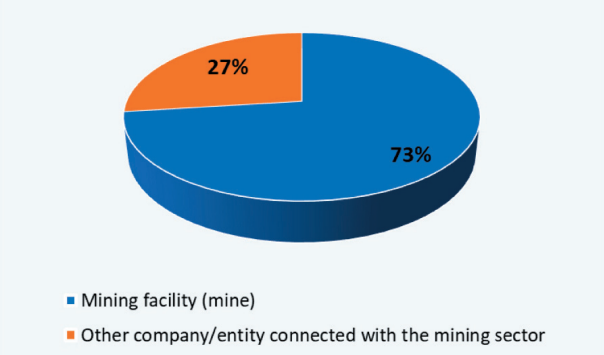

Fig. 5. Place of employment in the mining sector – experts

The experts were also asked about membership or work in various types of institutions associated with the mining industry. The data in Figure 6 indicate that the largest number of respondents declare membership or work in institutions/organisations/associations affiliated with the mining sector. None of the experts, however, declared activity in employers' organisations or associations.

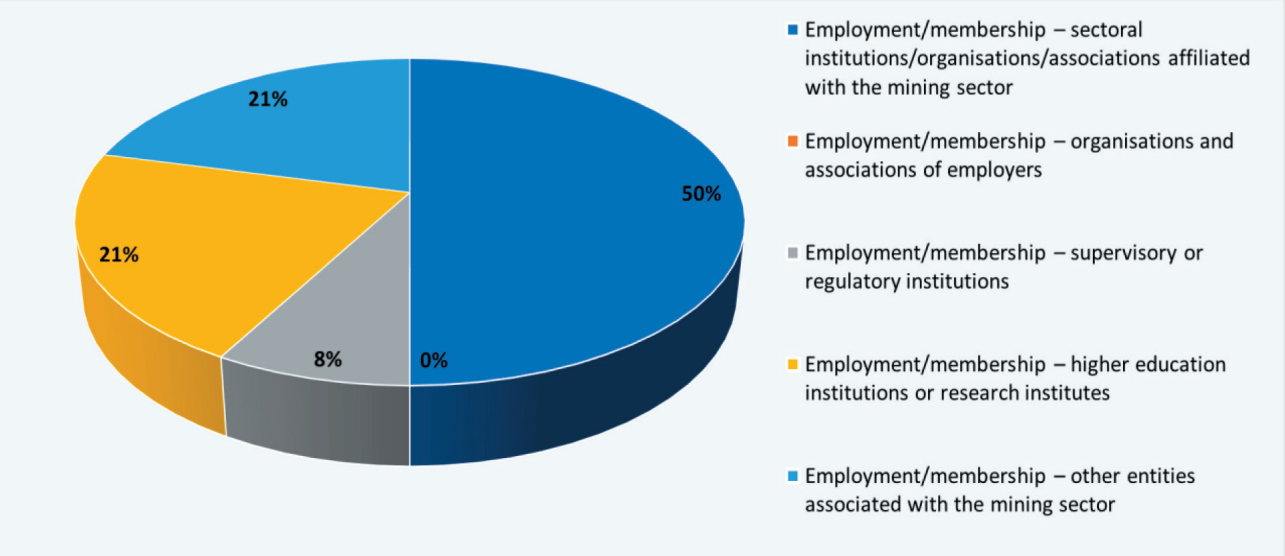

Fig. 6. Professional activity in the mining sector – experts

4. RESULTS OF THE CONSULTATIONS

The starting point for the analysis of the data collected during the empirical research was the overall assessment of the degree of familiarity with the PQF. The data shows that only 1.9% of the respondents declared that they had no familiarity with this concept. The vast majority of respondents claimed that they are familiar with the PQF concept – having good (45.7% of responses) or very good familiarity (15.2% of responses).

A fundamental issue in the project was also the perceived need for a document regulating the qualifications framework in the mining sector. Conclusions and findings on this matter were formulated on the basis of statements from the experts invited to take part in the study. The statements of respondents indicate a commonly held belief in the legitimacy of introducing a document to regulate the qualifications framework and the justification for this.

SQFM will provide employers with a new, more accurate tool for assessing employees' knowledge, skills and qualifications and the areas that need improvement or require further employee development. Currently, this improvement or development occurs intuitively or superficially and does not fully meet its objectives. With the creation of the SQFM, the employer will be equipped with a tool, whereby he will also be able to better assess candidates for new employees, in accordance with the framework.

The document in the mining sector is an innovative solution that would allow the relevant qualifications in the industry to be systematised and new career paths, innovative training methods and technologies to be created for employees. This document would support the planning of personal development, as well as provide the opportunity to assess the value of the diplomas or certificates attained in the mining sector.

4.1. Assessment of the level of current knowledge of mining sector employees

The next issue analysed was the overall assessment of selected aspects of the qualifications of non-management employees in mining sector companies, i.e. with regard to professional knowledge, technical skills and social competences. Respondents were asked to indicate the main deficits perceived in each area too.

The data indicate high ratings for competence and knowledge in the dimensions listed. Respondents were most often of the opinion that the majority of employees in non-managerial positions in mining enterprises have a high level of competence and knowledge. Regarding the issues assessed above (professional knowledge – Fig. 7, technical skills – Fig. 8 and social competences – Fig. 9) the percentage of respondents stating that the vast majority of this group of employees – almost all or even all employees – are well prepared to perform their professional functions exceeded 50%.

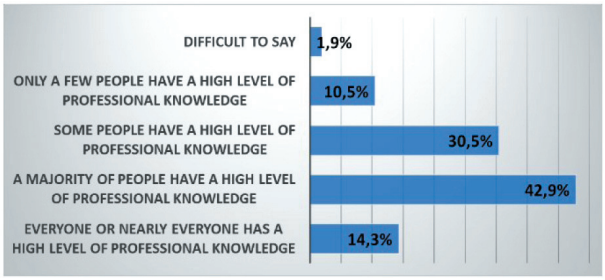

Fig. 7. The level of professional knowledge

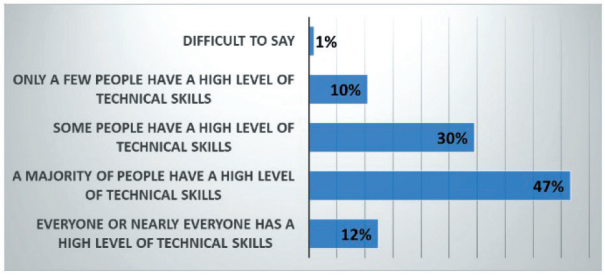

Fig. 8. The level of technical skills

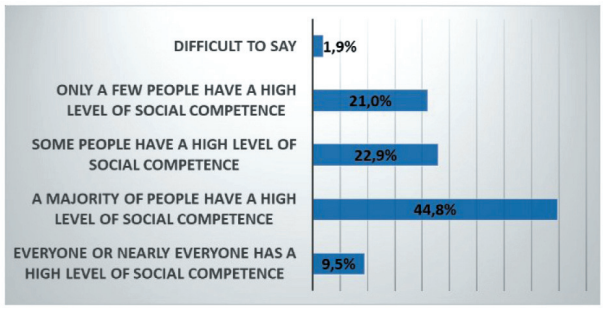

Fig. 9. The level of social competences

Assessments of the current qualifications of management staff in the mining sector are shown in Figures 10–14. The professional knowledge, technical skills, social competences, knowledge and skills in the field of organization and management as well as economics were assessed.

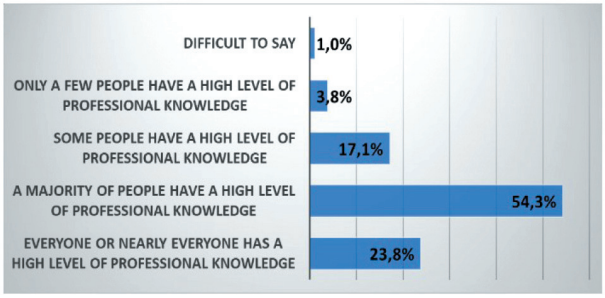

Fig. 10. The level of professional knowledge – management staff

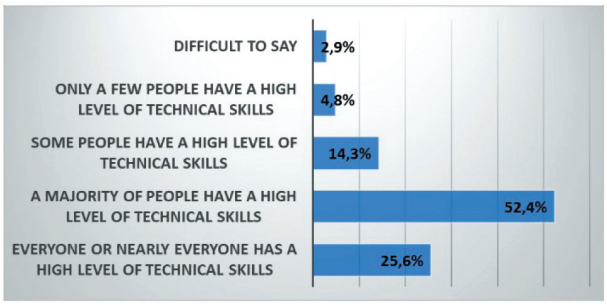

Fig. 11. The level of technical skills – management staff

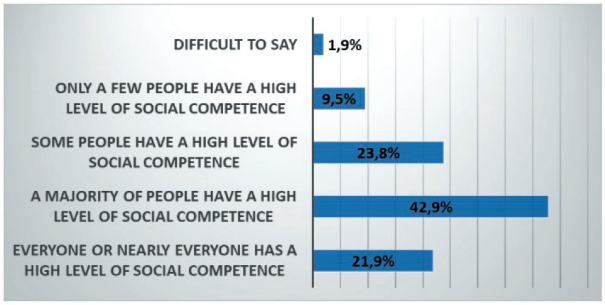

Fig. 12. The level of social competences – management staff

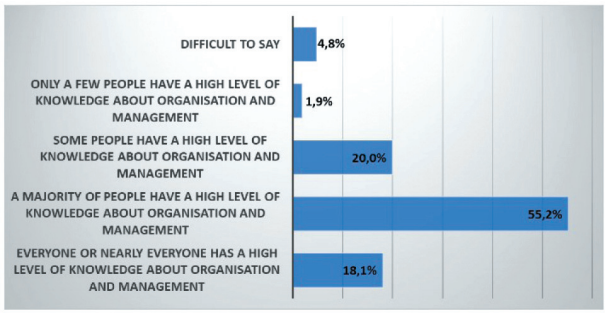

Fig. 13. The level of qualifications in the field of organization and management – management staff

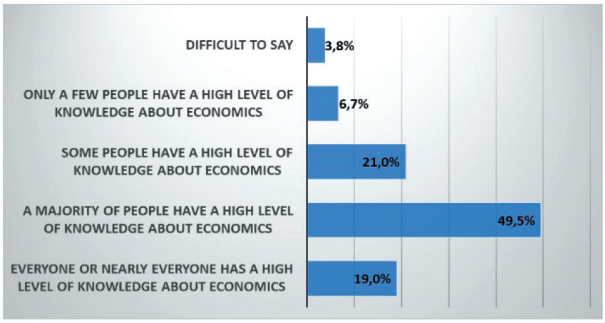

Fig. 14. The level of qualifications in the field of economic knowledge – management staff

As in the case of non-managerial employees, the conclusions from the quantitative material on the qualifications, competences and knowledge of the managerial staff in the specified areas are supplemented by the findings from analysing the statements of experts participating in the unstructured interviews. Their comments indicate a high assessment of the analysed aspects, but at the same time, point to the existence of certain deficits – especially in the area of social competence.

4.2. Assessment of the level of knowledge of the assumptions of SQFM

The concept of the project was to provide those taking part in the empirical research with materials presenting the premises of the Sectoral Qualifications Framework for the Mining Sector (SQFM). The respondents were asked whether they were familiar with the concept before receiving the materials.

About 70% of the respondents admitted that they learned this concept when they received the documentation for evaluation. The remaining respondents declared that they knew this concept earlier. This indicates the need for a wider dissemination of the assumptions of the SRKG. The respondents were also asked to evaluate the draft document. The first issue was the general assessment of the understanding of its assumptions.

The evaluation results were high and were as follows: fully understandable – 76%, some provisions are unclear to me – 18%, only some provisions are understandable – 3%, not understandable – 3%. Almost all the respondents stated that it was prepared in an understandable way. Only one in twenty of the respondents was critical of this issue. Respondents declaring doubts as to the provisions of the draft document were asked to indicate the provisions that were problematic for them. The recorded statements indicate basically: not entirely clear qualification criteria for individual positions, the lack of precision of some provisions and fears related to the effectiveness of the implemented solutions. Respondents declaring doubts about the provisions of the draft document were asked to indicate the element that was problematic. The recorded statements indicate that the main problems concerned: not entirely clear qualification criteria for particular positions, a lack of precision of some of the provisions, and concerns about the effectiveness of the introduced solutions.

4.3. Assessment of the effectiveness of introducing SQFM

Respondents were also asked to assess the consequences of introducing the principles included in SQFM in relation to such aspects as: increasing the qualifications of employees, improving the training programme for employees, improving the education programme for those wishing to work in the mining sector, increasing the level of improvement in the comprehensiveness and completeness of qualifications, increasing the level of the effectiveness of employee recruitment, and increasing the comprehensiveness and completeness of possible career paths in mining.

The presented data (Tab. 1) indicate a positive perception of the respondents in all specified areas of the changes that could take place as a result of implementing the Sectoral Qualifications Framework for the Mining Sector. The highest rating was given to the effectiveness of introducing the planned solutions in relation to increasing the level of improvements in the education system for people who want to work in the mining sector in connection with the introduction of the principles included in the SRKG.

A significant aspect of the structure of SQFM is its potential for further application and use. According to the expert team, the framework is an important element for systematising qualifications in the mining sector.

Table 1
Assessment of the effect of introducing the principles included in SQFM

Issue	Definitely yes	Rather yes	Rather no	Definitely no	Difficult to say
Assesment of an increase in the level of employees' qualifications due to the introduction of the principles included in SQFM	46.7%	39.0%	5.7%	1.0%	7.6%
Assesment of an increase in the level of improvement of the employee training programme due to the introduction of the principles included in SQFM	49.4%	41.0%	3.8%	1.0%	4.8%
Assessment of an increase in the level of improvement of the training programme for persons seeking employment in the mining sector due to the introduction of the principles included in SQFM	50.5%	39.0%	3.8%	2.9%	3.8%
Assesment of an increase in the level of improvement of the comprehensiveness and completeness of qualifications due to the introduction of the principles included in SQFM	49.5%	36.2%	5.7%	1.0%	7.6%
Assessment of an increase in the level of the effectiveness of employee recruitment due to the introduction of the principles included in SQFM	47.6%	35.2%	8.6%	3.8%	4.8%
Assessment of an increase in the level of the comprehensiveness and completeness of the career paths available in mining due to the introduction of the principles included in SQFM	47.6%	33.3%	6.7%	3.8%	8.6%

In analysing the possibilities for using SQFM, the project team identified five main areas:

- use by training institutions (to analyse the market demand for new qualifications using the SQFM level descriptors);
- use by validation institutions and awarding bodies (to adapt training programmes to the specific needs of employers in the mining industry, using the detailed SQFM level descriptors, taking into account the specific contexts and sectoral determinants),
- use by institutions developing descriptions of qualifications,
- use by employers (to conduct employment policies and plan the employment of qualified personnel in mining companies),
- use by employees (to plan individual professional development paths).

5. CONCLUSIONS AND RECOMMENDATIONS RESULTING FROM THE STUDY

Whilst the concept of the Polish Qualifications Framework (PQF) is known about, it would be worth-

while to conduct activities to further popularise the solutions for employment and professional advancement in the mining sector.

No objections were raised regarding the legitimacy of implementing a document to regulate the qualifications framework. The most important benefits associated with implementing the planned solutions include a clear systematisation of qualification criteria, facilitating the determination of professional career paths, facilitating the planning and implementation of training and vocational courses, unifying the education system in Poland with European solutions, and systematising the confirmation of skills, knowledge and competences.

The assessment of the competences, knowledge and qualifications of management staff is generally positive. At the same time, however, certain deficits were noted. The most important of these is relatively weak social competence ("soft skills") and organisational and management abilities. Moreover, among the deficits indicated were such issues as: the lack of education in a relevant field, lack of experience, deficiencies in innovative thinking and acting. In particular, attention should be paid to issues relating to social competence and the organisation and management of work teams.

The SQFM entries are assessed highly as being understandable and clear, and the concept itself was viewed positively as a preliminary draft.

The influence of SQFM on optimising the employment structure, better planned training, more effective use of human resources, and improving the vocational education and training offer to meet the current needs in the mining sector were emphasised.

The SQFM is an innovative solution, which can be a tool to support the systematisation of existing qualifications relevant to the mining industry and to develop new qualifications in response to social, economic, technical, technological and organisational changes.

References

[1] Ustawa z dnia 22 grudnia 2015 roku o Zintegrowanym Systemie Kwalifikacji, Dz.U. 2016, poz. 64.
[2] Polska Rama Kwalifikacji: https://prk.men.gov.pl/polska-rama-kwalifikacji-prk/ [30.06.2021].
[3] Europejskie Ramy Kwalifikacji, https://europa.eu/europass/pl/european-qualifications-framework-eqf [30.06.2021].
[4] Borowski M., Cała M., Augustyn A., Żurawski A., Napieraj A., Urbanek A., Bogacz P., Kuczera Z., Machniak Ł., Ratomska J.: *Sektorowa Rama Kwalifikacji dla Górnictwa (SRKG)*. Instytut Badań Edukacyjnych, Warszawa 2021.
[5] Ustawa z dnia 9 czerwca 2011 r. – Prawo geologiczne i górnicze, Dz.U. z 2019 r., poz. 868.
[6] Rozporządzenie Ministra Środowiska z dnia 2 sierpnia 2016 r. w sprawie kwalifikacji w zakresie górnictwa i ratownictwa górniczego, Dz.U. poz. 1229.
[7] Rozporządzenie Ministra Środowiska z dnia 8 grudnia 2017 r. w sprawie planów ruchu zakładów górniczych, Dz.U. poz. 2293.
[8] Instytut Badań Edukacyjnych: *Analiza kompetencji i kwalifikacji w sektorze górnictwa*. Warszawa 2021 [praca niepublikowana].
[9] https://bip.ibe.edu.pl/attachments/article/1779/Sektorowa%20Rama%20Kwalifikacji%20G%C3%B3rnictwa%2030.03.pdf [20.06.2021].
[10] Creswell J.W.: *Projektowanie badań naukowych: metody jakościowe, ilościowe i mieszane*. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2013.
[11] Grabowski H.: *Wykłady z metodologii badań empirycznych*. Oficyna Wydawnicza Impuls, Kraków 2013.
[12] Paluchowski W.J. 2010: *Spór metodologiczny czy spór koncepcji – badania ilościowe vs jakościowe*. Roczniki Psychologiczne, t. 13, Towarzystwo Naukowe KUL, Lublin.

ANETA NAPIERAJ, Ph.D., Eng.
MAREK BOROWSKI, prof.
AGH University of Science and Technology
al. A. Mickiewicza 30, 30-059 Krakow, Poland
{agrodek, borowski}@agh.edu.pl

ALDONA URBANEK, Ph.D.
JSW Szkolenie i Górnictwo
ul. Węglowa 4, 44-268 Jastrzębie-Zdrój, Poland
aurbanek@jswsig.pl

© 2021 Authors. This is an open access publication, which can be used, distributed and reproduced in any medium according to the Creative Commons CC-BY 4.0 License.