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EMPLOYING NEURODIVERSE PEOPLE ANALYSIS OF MANAGEMENT'S OPINIONS

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Purpose: This study aims to determine the employment opportunities of neurodiverse people, related to the assessment of the suitability of their skills and the adaptation of working conditions to their needs by the managers in Poland.

Design/methodology/approach: We evaluated the above-mentioned employment opportunities on the basis of a statistical analysis of empirical data collected among the 51 managers of various organisational entities in a Polish company.

Findings: Having studied the opinions of managers, we found that most of the unique skills of neurodiverse workers are perceived as valuable. At the same time, some critical adaptations required to meet their needs are regarded as problematic and thus may potentially pose a barrier to broader employment of neurodiverse people. In addition, the obtained results deepen the previous findings of researchers on the basis of the science of management and quality by verifying whether there is a relationship between managers' assessment of the usefulness of the skills of neurodiverse people and possible, in the opinion of managers, adaptations of working conditions.

Research limitations/implications: The limitation of the conducted research is the number of managers who took part in the survey. It needs to be emphasized that due to the purpose of the study, number of respondents was less important than the diversity of organisational entities, which they represented. Nevertheless, conducted research contributes to raising awareness of neurodiversity and may be the basis for further research.

Practical implications: The practical rationale for undertaking research in this area is the five times lower employment rate of neurodiverse people in Poland compared to the average for the European Union. The awareness of the managers' opinions about mentioned issues allows for institutional and organizational solutions to be prepared thus to increase the employment of these people.

Originality/value: To the best of the authors' knowledge, this is the first paper to examine employment opportunities of neurodiverse people in various organisational entities in a company. Findings from this study may be of interest to various groups, including neurodiverse people, organizations, state institutions and other researches.

Keywords: neurodiversity, autism, employment, skills, adaptation of working conditions.

Category of the paper: Research paper.

1. Introduction

The term neurodiversity, as adopted, refers to the cognitive differences within the human species that characterize high-functioning autism (Jaarsma, Welin, 2012, p. 20; Silberman, 2017, p. 23). The adoption of such a way of perceiving neurodiversity is consistent with its original understanding and results from the specific conditions and characteristics of autism compared to other neurodevelopmental differences, i.e. ADHD, dyslexia, dyscalculia, etc. The term "high-functioning autism" (HFA) refers to communication skills - verbal communication (Jaarsma, Welin, 2012, p. 20). In the light of the adopted assumptions, neurodiversity can therefore be treated as a variant of human diversity with specific advantages (Silberman, 2017, p. 23).

The belief that it is possible to build a competitive advantage based on the use of diverse human resources is strongly embedded in the science of management and quality. Although the dimensions of this diversity include disability (Loden, Rosener, 1991), the issue of neurodiversity thus far has not been included in it.

The findings of the researchers in the science of management and quality in the above-mentioned scope concern essentially two areas: the benefits for organizations resulting from the employment of autists and the need to adapt working conditions to their needs (Austin, Pisano, 2017; Whelpley, Perrault, 2021; Carrero et al., 2019; Mpofu et al., 2019).

Researchers point to the deficiency in research on neurodiversity and present proposals for deepening (Spoor et al., 2021; Mellifont, 2020; Richards, Sang, 2016) or extending the research carried out by taking into account other data (Priscott, Allen, 2021). In particular, there is an insufficient number of empirical studies in this area, which results in the lack of a consistent methodology for managing neurodiversity (Doyle, McDowall, 2021).

In management practice, an important question is to determine how managers perceive the usefulness of skills of neurodiverse employees and whether they are willing to adjust working conditions to their needs. Therefore, it seems particularly important in Poland, where the employment rate is ten times lower than the European average and amounts to only 2%, which may result from the low awareness of the management of organizations about neurodiversity.

We have conducted empirical research in response to the mentioned research gap and due to the low employment rate of people with autism in Poland.

The purpose of the conducted research was to empirically verify the usefulness of the skills of neurodiverse people for achieving goals, as perceived by the heads of organizational entities, and the possibility of adjusting working conditions to their needs.

The research was targeted at the management of the Water Authority of the City of Cracow which is the largest water supply and sewage company in the Lesser Poland Voivodeship. The choice of this enterprise was based on the size of employment, employing both manual and white-collar workers and the diversified scope of tasks of, which in the authors' opinion, increases the chance of identifying those among individual organizational entities of the enterprise with the greatest employment opportunities for neurodiverse people.

2. Neurodiversity in the organization - the results obtained from the literature review

First of all, considering employment opportunities for neurodiverse people in organizations requires to show the scale of occurrence and specificity of autism. In the European Union, the number of people with autism is estimated at 5 million (0.6%). It is worth noting that the number of diagnoses of autism is growing dynamically whereas in the 1980s it was diagnosed in one in every 2000 children (0.05%) and currently in 3 to 6 children in every 1000 (0.3-0.6%).

In Poland, the diagnosis of autism was started in the 1980s and its specificity was not taken into account in the disability adjudication system until 2010. Currently, according to the data of the Electronic National Disability Assessment Monitoring System, the judgments about autism or Asperger's syndrome constitute 20% of all certificates of disability issued in 2010-2019. As a result, it can be assumed that 45000 diagnosed people in Poland does not fully reflect the scale of the phenomenon (Supreme Audit Office, 2020, p. 6).

The International Statistical Classification of Diseases and Health Problems went into effect in Poland on the 1st of January 2022. The criteria for diagnosing the AUTISM SPECTRUM DISORDER, according to the ICD-11 for Mortality and Morbidity Statistics:

- Persistent deficits in initiating and sustaining social communication and reciprocal social interactions that are outside the expected range of typical functioning given the individual's age and level of intellectual development. Specific manifestations of these deficits vary according to chronological age, verbal and intellectual ability, and disorder severity.
- 2. Persistent restricted, repetitive, and inflexible patterns of behaviour, interests, or activities that are clearly atypical or excessive for the individual's age and sociocultural context.
- 3. The onset of the disorder occurs during the developmental period, typically in early childhood, but characteristic symptoms may not become fully manifest until later, when social demands exceed limited capacities.

4. The symptoms result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning. Some individuals with Autism Spectrum Disorder are able to function adequately in many contexts through exceptional effort, such that their deficits may not be apparent to others. A diagnosis of Autism Spectrum Disorder is still appropriate in such cases.

It should be emphasized that, in accordance with the concept of neurodiversity, the above-mentioned differences in the cognitive mechanisms characterizing people with autism constitute a natural variance within the human species (Jaarsma, Welin, 2012, p. 20) and are distinguished by "specific advantages that contributed to the development of technology and culture" (Silberman, 2017, p. 23). It is recognized that "differences make us individuals – the way we deviate from the norm, differences in the structure of the brain" (Grandin, Panek, 2021, p. 142).

In this approach, it is noticed that neurodivergent people have special skills, abilities and aptitudes, which include:

- the ability to perceive details in an isolated way, focus on a selected action (Lorenz, Heinitz, 2014, as cited in Roberson et al., 2021, p. 409),
- the ability to remember and analyse large amounts of data (Austin, Pisano, 2017, p. 97),
- associative thinking, creativity, predispositions in terms of routine work (Grandin, Panek, 2021, pp. 163-178, 266, 267),
- strict adherence to the rules (Baron-Cohen et al., 2009, pp. 1377-1383).

Making use of the specific skills of neurodiverse people can contribute to gaining a competitive advantage, increasing productivity, improving quality, innovation and employee engagement (Austin, Pisano, 2017, pp. 96-103) as well as improving the image of the organization (Whelpley, Perrault, 2021, pp. 210, 213, 215).

Despite the undoubted economic benefits for the organization, the employment of neurodiverse people remains at a low level (Roux et al., 2015, after Krzemińska et al., 2019, p. 453). In Poland, the employment rate of people with autism is 2%, while in the European Union it is 10% (Polish Economic Institute, JIM Foundation, 2022, p. 4).

The reason for the low employment is the lack of knowledge of the specificity of autism and the special skills of neurodiverse people among employers and organizations of the labour market environment and difficulties in adapting human resource management practices to the specificity of their functioning (Wehman et al., 2016, pp. 61-72).

The need to ensure non-standard working conditions (Krzemińska et al., pp. 455, 456) results from the difficulties experienced by people with autism and includes:

- resignation from the job interview (due to communication difficulties, as indicated by: Szulc et al., 2021, pp. 858-872),
- ensuring unchanging working conditions, the possibility of choosing the way of performing work and reducing the number of social interactions (related to attachment to routine, striving for predictability: Prizant, Fields-Meyer, 2017, pp. 28, 32, 34, 37, 56, 82, 86, 99, 146),
- reduction of sensory stimuli (caused by sensory hypersensitivity: Grandin, 2021, pp. 99, 102),
- accepting a different way of thinking and providing support in difficult emotional situations (due to the emotional lability of neurodiverse people: Prizant, Fields-Meyer, 2017, pp. 28, 32, 34, 37, 56, 82, 86, 99, 146).

Based on the analysis of the literature review, an attempt was made to determine the employment opportunities of neurodiverse people, related to the assessment of the suitability of their skills and the adaptation of working conditions to their needs by the managers in Poland.

3. Methods

The research is based on the survey conducted on the managers of Cracow Water Authority. We surveyed all of the 51 managers employed in the company. The diagnostic tool used was a survey questionnaire composed of questions related to the two domains:

- possibilities to adjust working conditions to the specific needs of neurodiverse people,
- suitability of the skills of neurodiverse people to the tasks supervised by the surveyed managers.

The study aimed to determine the possibilities and areas of using the potential of neurodiverse people in the workplace.

In the first question we asked the respondents to determine which of the listed skills/abilities/predispositions of neurodiverse employees may contribute to achieving the goals of the organizational units they manage. Among the mentioned characteristics are:

- ability to focus on a chosen task/aspect of action,
- ability to isolate details,
- ability to remember and analyze large amounts of information,
- creativity (unconventional thinking),
- associative thinking,

- predisposition to routinized tasks (preference for repetitive tasks),
- rigid adherence to rules and regulations.

The second question concerned the possibility of introducing the following adaptations to the needs of neurodiverse people in the workplace:

- forgoing the job interview,
- providing the ability to choose a way of working,
- restricting sensory stimuli (diversity and intensity of sounds/colors/smells/textures),
- ensuring unchanging work conditions,
- providing support in emotionally difficult situations,
- accepting different ways of thinking by colleagues,
- limiting the number of interpersonal interactions.

Responses to the survey questions were measured on the Likert scale.

Given the diversity of the jobs performed in the studied company, we expect the responses to be clustered around the specific jobs. Thus, we propose to analyse the data with the hierarchical clustering techniques. When using hierarchical clustering, a tree-based model is produced, with the root including the entire sample we want to divide, and the leaves of the model containing individual data points. In this study, we used the well-known Ward's clustering criterion (Murtagh, 2014). We used the numeric representatives of the survey questions as inputs to the clustering algorithm, so we treated our data as an interval one, and we assigned a value from 1 (Strongly disagree) to 5 (Strongly agree) to our 5-point Likert scale [i].

Having identified the clusters, we examine and assess specific attitudes towards neurodiverse workers within the detected groups. To objectize the analysis, we use a pairwise t-test with Holm correction (Holm, 1979) to test the null hypothesis that the means for a given response in the detected clusters are equal. On this basis, statistically significant differences in the opinions of the respondents were identified.

4. Results

Among the proposed adjustments, in the opinion of the majority of respondents (Figure 1), it is possible to:

- Provide support in emotionally difficult situations.
- Accept different ways of thinking by colleagues.

In other cases, the majority of surveyed managers deny the possibility of implementing the adjustments. In particular, it relates to forgoing the job interview.

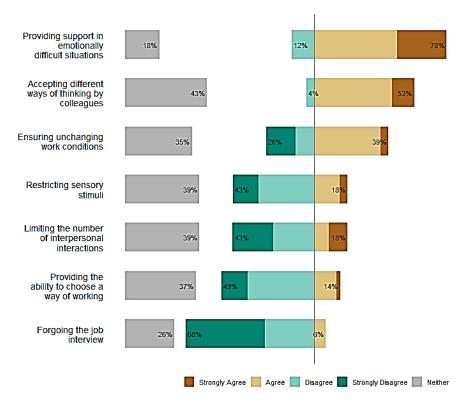


Figure 1. Please specify the possibility of introducing the following adjustments of working conditions to the needs of neurodiverse people in the organizational unit managed by you.

Source: Own elaboration based on the conducted questionnaire research.

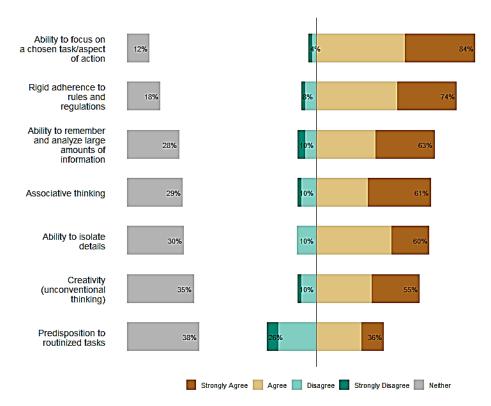


Figure 2. Please specify which of the following skills/abilities/predispositions of neurodiverse employees can contribute to achieving the objectives of the organizational unit you manage.

Source: Own elaboration based on the conducted questionnaire research.

The graph (Figure 2) shows a definite advantage of positive assessments of the usefulness of skills of neurodiverse people. Only in the area of predisposition to routinized tasks, there was a predominance of answers denying its usefulness in the process of achieving the goals of an organizational unit. Among the skills of neurodiverse people, the majority of surveyed managers found them useful:

- Ability to focus on a chosen task/aspect of action (84% of respondents).
- Rigid adherence to rules and regulations (74% of respondents).

On this basis, a conclusion can be drawn about the positive perception of the unique abilities, skills and predispositions of neurodiverse people and the possibility of using them in the process of achieving goals in various functional areas of the company's activity.

However, one should be cautious in overly optimistic interpretation of the obtained results. In addition to the unique abilities, skills and predispositions included in the study, neurodiverse people experience difficulties in the area of communication, interpersonal relationships and repetitive patterns of behaviour and interests. The second part of the survey, in which the possibility of adapting working conditions was assessed, includes a reference to these difficulties. For this reason, the conclusions ought to be formulated together.

It is therefore worth noting that in the areas where neurodiverse people experience difficulties (these are also the diagnostic criteria for autism), the majority of respondents denied the possibility of adaptation. These are the following adjustments to working conditions:

- Forgoing the job interview (denied by 94% of respondents).
- Providing the ability to choose a way of working (denied by 86% of respondents).
- Restricting sensory stimuli (diversity and intensity of sounds/colors/smells/textures) (denied by 82% of respondents).
- Limiting the number of interpersonal interactions (denied by 82% of respondents).

Therefore, taking into account the possibilities of adjustment in areas specific to autism, the results in terms of the usefulness of skills of neurodiverse people are not so favourable.

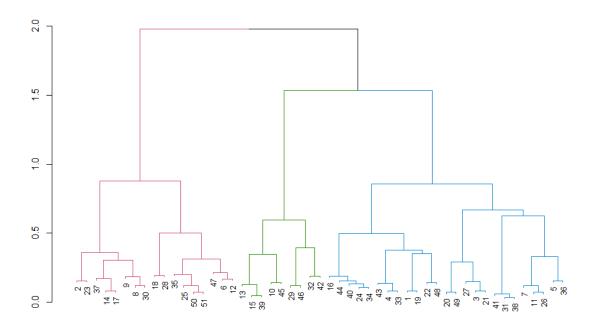


Figure 3. Outcome of the cluster analysis with responses to the questions on the possibilities to **adjust working conditions** as clustering variables.

Source: Own elaboration based on the conducted questionnaire research.

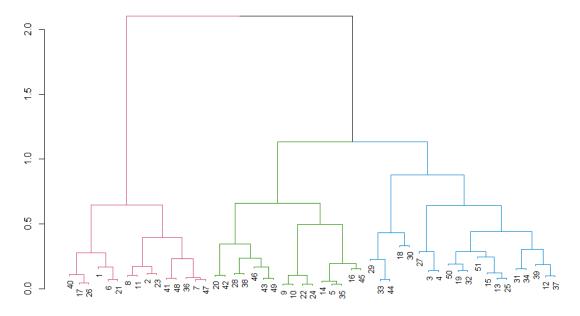


Figure 4. Outcome of the cluster analysis with responses to the questions on the **suitability of neurodiverse workers skills** as clustering variables.

Source: Own elaboration based on the conducted questionnaire research.

The conducted cluster analysis (Figure 3 and Figure 4) shows that the skills of neurodiverse workers can be useful in various organizational units of the company. As a result of the application of the cluster analysis, we expected to obtain groups that bring together organizational units of the enterprise similar in terms of tasks performed. However, it emerged that the resulting clusters are not related to the functional areas of the company and to the

implementation of mental/manual tasks by these organizational units [ii]. The same conclusions may apply to the possibility of adapting working conditions to the needs of neurodiverse people. This means that the mentioned possibilities were similarly assessed by organizational units representing various functional areas of activity and differentiated by the type of work performed (manual/mental).

Table 1.Variables' means. Clusters based on the responses to the questions on the possibilities to adjust working conditions

	Cluster		
Variable	A	В	C
Ability to focus on a chosen task/aspect of action	4,52 ^{BC}	3,94 ^A	3,56 ^A
Ability to isolate details	3,68	3,94	3,33
Ability to remember and analyze large amounts of information	3,80	3,94	3,56
Creativity (unconventional thinking)	3,84 ^C	3,88 ^C	2,89 ^{AB}
Associative thinking	4,08°	3,82	3,11a
Predisposition to routinized tasks (preference for repetitive tasks)	3,28	3,06	3,00
Rigid adherence to rules and regulations	4,08	3,76	4,00
Forgoing the job interview	1,28 ^{BC}	2,44 ^{AC}	3,00 ^{AB}
Providing the ability to choose a way of working	2,08 ^B	3,24 ^{AC}	2,44 ^B
Restricting sensory stimuli (diversity and intensity of			
sounds/colors/smells/textures)	2,60	2,88	2,33
Ensuring unchanging work conditions	2,68 ^B	3,76 ^{AC}	2,56 ^B
Providing support in emotionally difficult situations	3,00°	3,35 [°]	1,44 ^{AB}
Accepting different ways of thinking by colleagues	2,40 ^B	3,12 ^{AC}	$2,22^{B}$
Limiting the number of interpersonal interactions	2,00 ^B	3,59 ^{AC}	2,56 ^B

Note: letter A, B, C in the upper index refer to the p-value of the pairwise t-test (with Holm correction) with the null hypothesis of equal means. Upper case letter points to clusters with means statistically different at p < 0.05. Lower case letter points to clusters with means statistically different at p < 0.1

Source: Own elaboration based on the conducted questionnaire research.

At first, we turn to the analysis of clusters identified on the basis of responses to survey questions on the possibilities to adjust working conditions. The characteristics of the discovered clusters are presented in Table 1. Out of the 3 clusters, group B is marked by higher possibilities of adjusting working conditions in terms of:

- providing the ability to choose a way of working;
- ensuring unchanging work conditions;
- providing support in emotionally difficult situations;
- accepting different ways of thinking by colleagues;
- limiting the number of interpersonal interactions;
- average possibilities of Forgoing the job interview.

The cluster B lumps together, among others, the following organizational units: management office, administration department, environmental protection team, technical department. These units employ both white-collar and manual workers and carry out various functional tasks.

Concurrently, managers in cluster B assess the usefulness of the skills of neurodiverse people, such as creativity (unconventional thinking), higher than cluster C and the ability to focus on a chosen task/aspect of action lower than Cluster A. We presume that these results illustrate organizational specificity - organizational units where employee creativity is important are also characterized by greater opportunities to adjust working conditions. In this context, it is worth noting higher ratings of managers of organizational units from cluster B in terms of the ability to: isolate details and remember and analyse large amounts of information (although these results are statistically insignificant). Such an interpretation is confirmed by the relatively low values of the following variables in cluster B (bearing in mind the fact that they are not statistically significant):

- predisposition to routinized tasks (preference for repetitive tasks),
- rigid adherence to rules and regulations.

Table 2.Variables' means. Clusters based on the responses to the questions on the suitability of neurodiverse workers' skills

	Cluster		
Variable	A	В	С
Ability to focus on a chosen task/aspect of action	4,67 ^B	3,80 ^A	4,13
Ability to isolate details	$4,27^{B}$	3,16 ^{AC}	$3,81^{B}$
Ability to remember and analyse large amounts of information	4,53 ^{cB}	3,25 ^{Ac}	3,81 ^{ab}
Creativity (unconventional thinking)	4,60 ^{BC}	3,45 ^A	3,13 ^A
Associative thinking	4,93 ^{BC}	2,90 ^{AC}	3,94 ^{AB}
Predisposition to routinized tasks (preference for repetitive tasks)	3,00°	2,74 ^C	3,81 ^{aB}
Rigid adherence to rules and regulations	4,20 ^B	3,45 ^{AC}	4,38 ^B
Forgoing the job interview,	1,87	2,05	1,94
Providing the ability to choose a way of working	2,80	2,40	2,44
(e.g. cont. Table 2)			
Restricting sensory stimuli (diversity and intensity of sounds/colors/			
smells/textures)	2,73	2,65	2,56
Ensuring unchanging work conditions	2,53	3,20	3,25
Providing support in emotionally difficult situations	3,13	2,74	2,69
Accepting different ways of thinking by colleagues	2,67	2,60	2,56
Limiting the number of interpersonal interactions	2,20	2,75	2,88

Note: letter A, B, C in the upper index refer to the p-value of the pairwise t-test (with Holm correction) with the null hypothesis of equal means. Upper case letter points to clusters with means statistically different at p < 0.05. Lower case letter points to clusters with means statistically different at p < 0.1.

Source: Own elaboration based on the conducted questionnaire research.

Using responses to the survey questions on the suitability of the neurodiverse workers' skills as input to the clustering algorithm, we obtain different divisions (see Table 2 for the characteristics). The results confirm the distinction between managers that are concerned mostly on rule-based and routinized behavior, and the managers who value creativity, isolating details and associative thinking.

The highest assessments of the usefulness of the skills of neurodiverse people were recorded in group A, which highly values:

- ability to focus on a chosen task/aspect of action,
- ability to isolate details,
- ability to remember and analyse large amounts of information,
- creativity (unconventional thinking),
- associative thinking.

At the same time, managers of organizational units in cluster A rated relatively low:

- predisposition to routinized tasks (preference for repetitive tasks),
- rigid adherence to rules and regulations.

Comparing cluster A to other groups, we see rather limited evidence on the concurrence of high adaptation possibilities and high assessments of the skills of neurodiverse workers. Looking for a confirmation of the relationship between possibilities to adjust working condition and valuing skills connected to creativity (visible in clusters presented in Table 1), we found more nuanced outcomes. The group of managers valuing these skills are rather skeptical to limit the number of interpersonal interactions and to ensure constant working conditions, but they see possibilities to provide the ability to choose a way of working, and to provide support in emotionally difficult situations.

5. Conclusion

In this article neurodiversity is associated with autism and can therefore be treated as a variant of human diversity with specific advantages (Silberman, 2017, p. 23). The literature indicates a number of benefits resulting from the employment of neurodiverse people, the achievement of which requires appropriate adjustments to working conditions. Taking into consideration the paucity of empirical research in management and quality sciences and the context of the low employment of neurodiverse people in Poland we set out to check employment opportunities for neurodiverse people related to the usefulness of their specific skills and possibility of adjusting working conditions to their needs. For this purpose we used the results of a survey conducted among the executives of the Water Authority of the City of Cracow. The results were subjected to statistical analysis using hierarchical clustering techniques.

Analysis of respondents' answers shows a definite advantage of positive assessments of the, described by various authors, usefulness of skills of neurodiverse people in the process of achieving the objectives of organizational units. In particular, their managers found the following useful: ability to focus on a chosen task/aspect of action and rigid adherence to rules

and regulations. Only in the area of predisposition to routinized tasks, there was a predominance of answers denying its usefulness.

It is worth noting that in the areas where neurodiverse people experience difficulties, the majority of respondents denied the possibility of adaptation. The following adjustments to working conditions found little support among surveyed managers: forgoing the job interview, providing the ability to choose a way of working, restricting sensory stimuli (diversity and intensity of sounds/colours/smells/textures), limiting the number of interpersonal interactions.

The conducted cluster analysis shows that the skills of neurodiverse workers can be useful in various organizational units of the company, which are not related to the functional areas of the company and the implementation of mental/manual tasks by these organizational units. The same conclusions may apply to the possibility of adapting working conditions to the needs of neurodiverse people. The analysis also revealed that the groups of managers who place the greatest value on the unique skills of neurodiverse people are not the ones who are most eager to adapt working conditions. The lack of correlation between the ability to adapt to these conditions and the assessment of the usefulness of the skills may be an impediment to broader participation of neurodiverse workers in the labour market. Our analysis, on the other hand, revealed that there are units across different organizational areas where conditions are adaptable and where skills - particularly those related to creativity - are valued. These specific units may be the best places to hire neurodiverse people. The follow-up studies, which we aim to undertake in the future, can build upon this finding.

These results correspond to the researchers' findings regarding the possibility of gaining a competitive advantage (in this study, we referred to it as the achievement of the goals of an organizational unit) based on various human resources. In the light of the findings of our study, a potential barrier to employment of these people may be indicated in the literature as a necessity to adapt working conditions to the needs of neurodiverse people. For this reason, the obtained results may be the basis for further analyses of both management theoreticians and practitioners. Further research in the area may result in finding solutions to increase employment which are possible to be implemented in enterprises. The outcome may also be useful to public institutions in Poland, which could gain measurable benefits for the state budget by increasing the employment of neurodiverse people.

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Footnotes

- [i] See (Wu, Leung, 2017) for the discussion on the controversy behind such a treatment.
- [ii] Organizational units highly evaluating the skills of neurodiverse employees include a variety of departments, such as: Department of the Water Supply System, Financial Department, IT department, Customer service centre, Investment implementation department, Warehouse of the purchasing department and Technical department.