

ATTITUDES OF MANAGERS OF THE HIGH-TECH ENTERPRISES IN POLAND

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Purpose: The article attempts to answer the following questions: What key competences and attitudes should characterise the management staff in the high-tech sector; is there an attitude gap, that is, a discrepancy between the desired and actual attitudes of the managers of high-tech enterprises; and what actions can contribute to minimising an identified attitude gap?

Design/methodology/approach: Answering the above-mentioned research questions required reviewing the literature on the subject and conducting research. The research covered 504 managers representing all levels of management in high-tech enterprises operating in Poland. The collected data were subjected to statistical analysis, based on which conclusions were drawn.

Findings: The research results show that the key competences of creativity, knowledge management and entrepreneurship are the most highly evaluated of the surveyed attitudes of managers (the lowest gap). A disturbing phenomenon is the relatively low assessment of the attitudes (a large gap) characterising the key competences of basing communication systems on modern information technologies, innovation and cooperation in relational systems.

Practical implications: The presented results on the skills gap is part of a wider research project aimed at identifying and assessing the levels of the key competences of managers employed in high-tech enterprises. In order to minimise the identified attitudes gap, specific actions were recommended be taken to improve these attitudes.

Originality/value: The value of the conducted research procedure is the identification of key attitudes of tactical and operational level managers of high-tech enterprises and their arrangement due to the size of the gap between the actual and desired state. Actions to improve key managerial attitudes were also identified. These activities may help increase the effectiveness and competitiveness of Polish high-tech enterprises.

Keywords: core competencies, managerial competences, attitudes of managers, high-tech enterprises.

Category of the paper: Research Paper.

1. Introduction

When characterising human capital, it should be emphasised that, nowadays, the most valuable resource is people. Human capital is the basic pillar of the entire intellectual capital of an organisation (Jabłoński, 2009, p. 73). There are a number of reasons why people are identified as an organisation's invaluable resource. First of all, it is the people employed in an organisation who decide on the use of the remaining resources of the enterprise. The success of an organisation is built by people and their competences determine its efficiency and effectiveness. Competences are an internal property of an individual: motives, features, attitudes, values, knowledge and skills, which are in a cause-and-effect relationship with exceptional achievements at work or in a given situation based on specific criteria (Spencer, Spencer, 1993, pp. 9-11). The importance of the issue of competences prompted the authors of the article to undertake research aimed at identifying the key competences of high-tech managers and any gap in their attitudes, which are among the components constituting key competences. The problem outlined above is the basis for formulating the three research questions that define the scope of the research procedure presented in this article:

- What key competences and attitudes should characterise the managers of high-tech enterprises?
- Is there an attitude gap, that is, a discrepancy between the desired and actual attitudes of high-tech managers?
- What actions can contribute to minimising the identified attitude gap?

2. The essence of managerial attitudes

The concept of competences was first used by the American social psychologist McClelland in the 1970s, and since the beginning of the 1980s, competences have become the focus of interest for many researchers. The authors have reviewed the literature on the subject (McClelland, 1973; Boyatzis, 1982; Wynne, Stringer, 1997; Wood, Payne, 1998; Becker, Huselid, Ulrich, 2002; Rankin, 2002; Whiddett, Hollyforde, 2003; Delobbe, Karnas, Vondenberghe, 2003; Woodruffe, 2001; Filipowicz, 2004; Friesen, Anderson, 2004; Tate, 1995; Cheatham, Chivers, 2005; Dessler, 2009; Oleksyn, 2010; Kuz'mina, P'yankova, Tret'yakova, 2020; Dubois, 1993; Spencer, L., Spencer, S., 1993; Thierry, Sauret, Monod, 1993; Nordhaug, Gronhaug, 1994; Lévy-Leboyer, 2009; Jahja, Kleiner, 1997, Roszyk-Kowalska, 2018), which has revealed that the notion of competences is ambiguous. Competences are classified in a number of ways, and the modern concepts of competences, regardless of the area in which they are used, increasingly expand in scope.

Competences are the knowledge, skills, behaviour, attributes and attitudes that distinguish those who achieve the highest efficiency (Gick, Tarczyńska, 1999, p. 45). These are behaviours that distinguish employees in various professional situations, determined by the knowledge and skills they use, as well as their attitudes and motivations (Sall, 2004, p. 14). The basis of competences is the knowledge, skills and attitudes related to the performance of specific activities, regardless of the manner in which they were acquired and whether they have been confirmed through a validation procedure. Relatively often, the components of competences include an attitude understood as:

- permanent mental representation of people, places or objects making a person react with positive or negative emotions and influencing behaviour (Rathus, 2011, p. 769),
- general orientation that can make a person – when certain stimuli appear – behave or react in a certain way (Frankfort-Nachmias, Nachmias, 1992, p. 269),
- permanent evaluation – positive or negative – of people, objects and ideas (Aronson, Wilson, Akert, 2000, p. 313),
- readiness and a tendency to react in a certain way to certain stimuli (Oppenheim, 2001, p. 203),
- an evaluative disposition based on cognitive elements, emotional reactions, intentions for the future and behaviour (Zimbardo, Leippe, 1991, p. 52),
- a relatively stable, dynamic organisation that determines how an individual behaves in relation to other people or objects, cognitive and emotional structures and processes, and patterns of behaviour, characterised by varying degrees of complexity, compactness, strength, persistence, intensity, importance and adequacy (Holly, 1985, p. 215).

When analysing the concept of an attitude, a certain inconsistency between declared attitudes and behaviour is noticed. To explain this, it is necessary to distinguish the categories of general attitudes and attitudes towards behaviour. The first means a general attitude of a person to an object: a person/group of people, a social group, an institution, an event or a product. The other indicates attitudes towards specific behaviours related to these objects. When there is no relationship between the general attitude and a specific behaviour, there is evaluative inconsistency (Stasiuk, Maison, 2017, p. 342).

To recapitulate, it is further assumed that an attitude is a relatively permanent tendency to positively or negatively respond to various objects – people, ideas and specific things – which determines behaviour in certain situations.

3. Research method

The research procedure aimed at identifying the key competences and key attitudes of high-tech managers, and assessing the attitude gap, included three stages:

Stage 1. Identification of the key attitudes of high-tech managers based on the opinions of managers and experts representing selected academic centres in Poland and business.

Stage 2. Identification of the variables characterising the key attitudes of hi-tech managers based on the opinions of managers and experts.

Stage 3. Identification of an attitude gap understood as a discrepancy between the expected attitude, determined based on indications made by strategic managers, and the declared attitude, defined based on indications made by tactical and operational managers. To assess the expected and declared key attitudes described by the degree of acceptance of selected statements, a seven-point Likert scale was used (1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neutral, 5 – somewhat agree, 6 – agree, 7 – strongly agree).

The first step in the implementation of the third stage, which was defined as ‘identification of the attitude gap’, involved selecting strategic, operational and tactical managers of high-tech enterprises.

The questionnaires were addressed to the management staff of all levels in high-tech enterprises operating in Poland. The survey questionnaire was sent to the management of all enterprises forming the high technology sector, where the number of employees was 250 people and more. A total of 563 correctly completed questionnaires were received. However, not all of them were analysed in the research process because of a restriction introduced to the survey questionnaire, in which strategic managers were asked how long tactical and operational managers should work in a current company and in the position currently held so that their key competences could be identified. This means that, although 4.01% of the managerial staff of all high-tech enterprises participated in the research procedure, the effective size of the research sample accounted for 3.62% of this staff. A detailed analysis of the representativeness of the research sample is presented in the work of Roszyk-Kowalska (2018, pp. 104-108). The possible limitations of inference based on the research are related to the fact that, without having additional information on the characteristics of the management staff who participated in the study, it was assumed that the mechanism behind the fact of taking part or not in the survey is independent of the attitudes studied.

The analysis of the research material obtained made it possible to determine the mean length of service of tactical and operational managers in the position held, which was 1.68 years. As a result, 55 questionnaires filled in by tactical and operational managers were eliminated from further analysis because, in order to analyse the key competences of tactical and

operational managers, the length of service should be longer than 1.68 years (this threshold was indicated by strategic managers). Then, the mean length of service in a current enterprise in the positions occupied by tactical and operational managers was calculated. The mean was 2.83 years, which resulted in the exclusion of four questionnaires that did not meet the required condition for further analysis. These means together (a restrictive condition for the position held and the length of service in a current enterprise) resulted in the reduction of the research sample at the tactical and operational levels.

In total, the responses of 504 managers at all levels in high-tech enterprises were analysed. The research sample consisted of managers aged 23 to 72. Most were tactical managers – 43.7%, while the share of the other two levels was similar and amounted to approximately 28% each. The highest percentage of men was at the tactical level of management (70.5%) and the lowest at the operational level (63.64%). The lowest mean ages were characteristic for operational managers and were slightly over 38 for men and slightly over 39 for women. Strategic managers were the oldest – here the mean ages were 51.3 years for men and 51.1 for women.

Due to age, the above-mentioned sections of the research sample (*management level * gender*) constituted weakly or moderately differentiated sub-groups – the coefficient of variation ranged from 12.6% (the most homogeneous category in terms of age: men occupying the strategic management level) to 26.1% (the most heterogeneous category in terms of age: women at the operational management level). The age distributions observed in the research sample are generally unimodal, with marked right-sided asymmetry, indicating more frequent participation of managers aged lower than the mean. The exception here is the category of women occupying the strategic management level, where the age distribution is bimodal with the dominant age groups of 40-45 and 55-60.

In order to synthetically present the broader context of the high-tech sector and its changes, the data of Statistics Poland (Główny Urząd Statystyczny – GUS) for the years 2001-2020 was used. This indicates a stable share of the high-tech sector sold production in the industrial processing section. This remained at the level of about 5% in the discussed period (see Figure 1). It should be noted that, in accordance with the methodology used in Polish official statistics, entities in the industrial processing section are classified according to the degree of technological advancement (high, medium-high, medium-low and low) (GUS, 2022). It is worth paying attention to the positive trend from 2001 to 2020, which was undoubtedly a decrease in the share of sold production in the industrial processing section in entities classified as low technology (a decrease from 41.9% in 2001 to 35.7% in 2020). At the same time, the share of sold production in the industrial processing section in high and medium-high technology companies increased in the same period (from 27.4% in 2001 to 32.4% in 2020).

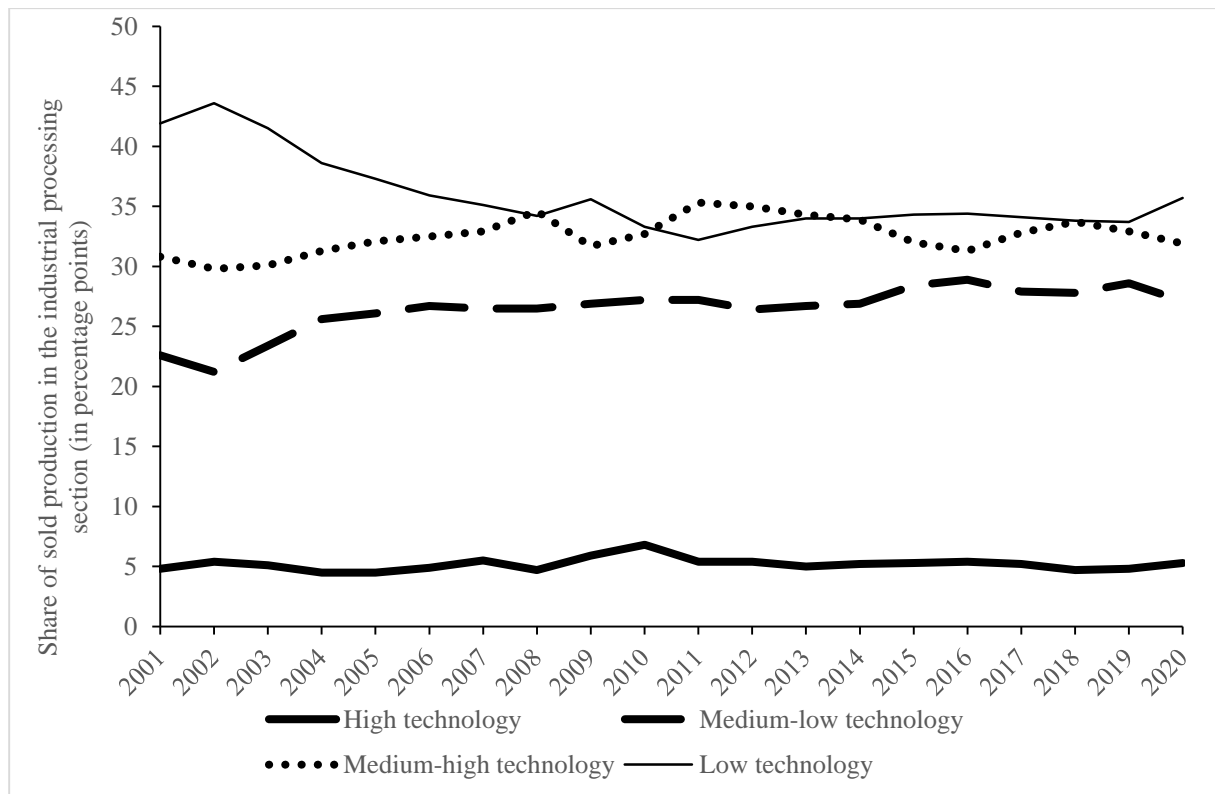


Figure 1. Changes in the structure of sold production in the industrial processing section by the level of technology from 2001 to 2020.

Source: GUS data (<https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/>, April 12, 2022).

4. Research results

At the first research stage, participating managers and experts were presented with a set of 18 potential key competences, which were identified based on a literature review and practical experience. Taking into account the opinions of managers and experts, as well as limiting the number of key competences to those nine out of 18 for which the mean importance assigned by experts was the highest, the following key competences in high-tech sector enterprises were included:

- high level of entrepreneurship,
- high level of creativity,
- effective processes of acquiring, using and sharing knowledge,
- extensive use of the potential of teamwork,
- high level of innovation,
- ability to cooperate in relational systems,

- high independence of employees,
- skilful management of research and development (R&D) activities,
- basing communication systems on modern information technologies.

The second stage of the research aimed at transforming the key competences of high-tech managers into a set of variables characterising key attitudes. Based on the opinions of managers and experts, a set of 54 potential key attitudes was limited to the 27 attitudes of the highest importance. Table 1 shows the variables characterising key competences transformed into a set of variables characterising key attitudes.

Table 1.

Transformation of the key competences of high-tech managers into a set of variables characterising key attitudes

Key competences (abbreviation)	Key attitudes (abbreviation)
Entrepreneurship (En)	persistence (En1)
	independence in thinking, opinions and judgements (En2)
	self-esteem (En3)
Creativity (C)	no fear of making a mistake or failing (C1)
	readiness for continuous learning (C2)
	cognitive curiosity (C3)
Knowledge management (KM)	stimulating employees to develop (KM1)
	focus on the success of the organisation (KM2)
	openness to other people (KM3)
Teamwork (T)	determination in pursuing goals (T1)
	focus on tasks and success (T2)
	acceptance of people as they are (T3)
Innovation (I)	questioning what others consider to be unchangeable (I1)
	searching for more relevant solutions (I2)
	open attitude towards innovation (I3)
Cooperation in relational systems (CRS)	positive attitude towards other entrepreneurs (CRS1)
	understanding the need to create and maintain good relations with the environment (CRS2)
	prosocial attitude (CRS3)
Empowerment (E)	resistance to stress (E1)
	self-criticism (E2)
	resignation from one's own influence in favour of employees with higher competences (E3)
R&D management (RDM)	personal responsibility for the development of the organisation (RDM1)
	propensity to take risks (RDM2)
	focus on development (RDM3)
Basing communication systems on modern information technologies (B)	willingness to learn new things (B1)
	high level of achievement motivation (B2)
	involvement in the implementation of tasks (B3)

Source: own study based on the research sample.

The Mann–Whitney U test was used to assess the significance of a gap in the key attitudes. The null hypothesis was formulated in such a way that the distributions of the mean significance of a given key attitude indicated in the compared populations (strategic managers and tactical or operational managers) were equal. The level of significance was set at $\alpha = 0.05$.

The W test statistic was determined as follows:

$$W = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_1 \quad (1)$$

$$W' = n_1 n_2 + \frac{n_2(n_2 + 1)}{2} - R_2 \quad (2)$$

where:

- the sizes of the samples taken from population 1 and population 2, respectively;
- the sums of the ranks for the samples taken from population 1 and population 2, respectively.

The lesser value W or W' was subject to interpretation.

Analysis of the results has allowed the following conclusions to be formulated (Table 2):

- the smallest attitude gap is in: readiness for continuous learning (0.74), stimulating employees to develop (1.28), perseverance (1.28) and openness to other people (1.32),
- the largest attitude gap is in: willingness to learn new things (2.13), involvement in the implementation of tasks (1.96), as well as understanding the need to create and maintain good relations with the environment (2.2).

Table 2.

Gaps in the key attitudes and the significance from the smallest to the largest attitude gap

Key competences	Key attitudes	Mean assessment by strategic managers	Mean assessment by tactical or operational managers	Attitude gap	Test statistics (W)	p-value
C	C2	6.49	5.75	0.74	41381.5	< 0.05
KM	KM1	6.38	5.10	1.28	41590.0	< 0.05
En	En1	6.43	5.15	1.28	40529.0	< 0.05
KM	KM3	6.32	5.00	1.32	39652.5	< 0.05
T	T3	6.34	5.01	1.34	38603.5	< 0.05
C	C3	6.31	4.95	1.36	41079.0	< 0.05
E	E3	6.28	4.86	1.42	40486.5	< 0.05
En	En3	6.41	4.98	1.43	42638.5	< 0.05
T	T1	5.66	4.20	1.46	38553.0	< 0.05
RDM	RDM2	6.14	4.64	1.50	41037.0	< 0.05
C	C1	6.18	4.68	1.50	40585.0	< 0.05
KM	KM2	6.51	5.01	1.51	41938.0	< 0.05
CRS	CRS1	6.14	4.61	1.52	41848.0	< 0.05
RDM	RDM3	6.39	4.85	1.54	42678.5	< 0.05
En	En2	6.05	4.46	1.59	40791.0	< 0.05
E	E2	6.36	4.77	1.59	42149.5	< 0.05
B	B2	6.46	4.80	1.65	43519.0	< 0.05
RDM	RDM1	6.59	4.91	1.68	44173.0	< 0.05
CRS	CRS3	6.49	4.81	1.69	43617.0	< 0.05
I	I2	6.51	4.83	1.69	43695.5	< 0.05
T	T2	6.06	4.30	1.76	41833.5	< 0.05
E	E1	6.49	4.73	1.76	44171.5	< 0.05
I	I1	5.64	3.78	1.86	40502.0	< 0.05

Cont. table 2.

I	I3	6.36	4.50	1.86	43914.0	< 0.05
CRS	CRS2	6.53	4.61	1.92	45215.5	< 0.05
B	B3	6.39	4.44	1.96	44245.5	< 0.05
B	B1	6.34	4.20	2.13	43707.5	< 0.05

Source: own study based on the research sample.

Analysis of the data contained in Table 3 makes it possible to conclude that the largest gap concerns attitudes constituting such key competences as: basing communication systems on modern information technologies (5.74) and innovation (5.4). On the other hand, the smallest attitude gap covers the following key competences: creativity (3.59) and knowledge management (4.10). Moreover, within the scope of the examined key competences, the following has been found:

- entrepreneurship – the largest gap is in the attitude of ‘independence in thinking, opinions and judgements’ (1.59) and the smallest one concerns ‘persistence’ (1.28),
- creativity – the largest gap is in the attitude of ‘no fear of making a mistake or failing’ (1.5), and the smallest one is in ‘readiness for continuous learning’ (0.74),
- knowledge management – the largest gap is in the attitude of ‘focus on the success of the organisation’ (1.51) and the smallest one concerns ‘stimulating employees to develop’ (1.28),
- teamwork – the largest gap is in the attitude of ‘focus on tasks and success’ (1.76) and the smallest one concerns the attitude of ‘acceptance of people as they are’ (1.34),
- innovation – the greatest gap is in the attitudes of ‘questioning what others consider to be unchangeable’ and ‘open attitude towards innovation’ (1.86), and the smallest one concerns ‘searching for more relevant solutions’ (1.69),
- cooperation in relational systems – the largest gap exists in the attitude of ‘understanding the need to create and maintain good relations with the environment’ (1.86) and the smallest one concerns ‘positive attitude towards other entrepreneurs’ (1.52),
- empowerment – the largest gap is in ‘resistance to stress’ (1.76) and the smallest one concerns the attitude of ‘resignation from one’s own influence in favour of employees with higher competences’ (1.42),
- R&D management – the biggest gap is in the attitude of ‘personal responsibility for the development of the organisation’ (1.68), while the smallest one concerns ‘propensity to take risks’ (1.50),
- basing communication systems on modern information technologies – the greatest gap is in ‘willingness to learn new things’ (2.13) and the smallest one concerns the attitude of ‘high level of achievement motivation’ (1.65).

Table 3.
Attitude gap in the structure of key competences

Key competences	Key attitudes	Attitude gap	Total
Basing communication systems on modern information technologies	willingness to learn new things	2.13	5.74
	high level of achievement motivation	1.65	
	involvement in the implementation of tasks	1.96	
Innovation	questioning what others consider to be unchangeable	1.86	5.40
	searching for more relevant solutions	1.69	
	open attitude towards innovation	1.86	
Cooperation in relational systems	positive attitude towards other entrepreneurs	1.52	5.13
	understanding the need to create and maintain good relations with the environment	1.92	
	prosocial attitude	1.69	
Empowerment	resistance to stress	1.76	4.77
	self-criticism	1.59	
	resignation from one's own influence in favour of employees with higher competences	1.42	
R&D management	personal responsibility for the development of the organisation	1.68	4.72
	propensity to take risks	1.50	
	focus on development	1.54	
Teamwork	determination in pursuing goals	1.46	4.56
	focus on tasks and success	1.76	
	acceptance of people as they are	1.34	
Entrepreneurship	persistence	1.28	4.30
	independence in thinking, opinions and judgements	1.59	
	self-esteem	1.43	
Knowledge management	stimulating employees to develop	1.28	4.10
	focus on the success of the organisation	1.51	
	openness to other people	1.32	
Creativity	no fear of making a mistake or failing	1.50	3.59
	readiness for continuous learning	0.74	
	cognitive curiosity	1.36	

Source: own study based on a research sample.

The biggest gap between the expected and actual key attitudes in high-tech enterprises concerns the willingness to learn new things and involvement in the implementation of tasks (this gap relates to the key competence of basing communication systems on modern information technologies) and understanding the need to create and maintain good relations with the environment (the gap concerns the key competence of cooperation in relational systems).

In order to minimise the identified attitude gaps, it is postulated actions should be taken that may contribute to shaping attitudes conducive to their minimisation. The actions shaping the attitudes of high-tech managers in line with their organisations' expectations should include:

- basing communication systems on modern information technologies – activities supporting the shaping of attitudes encouraging learning new things and strengthening involvement in the implementation of commissioned tasks,

- innovation – shaping the attitudes of openness to the processes of creating and implementing new solutions as well as breaking patterns by questioning what is considered unchangeable by other participants in the organization,
- cooperation in relational systems – shaping the attitudes of understanding the need to create and maintain good relations with contractors (customers and suppliers) and focusing on establishing appropriate relationships with participants in the organization,
- empowerment – participating in training and courses strengthening resistance to stress in the workplace and the ability to look self-critically at the behaviour and actions taken by members of the organization,
- R&D management – shaping the attitude of dissatisfaction with the current state by focusing on development and continuous improvement as well as awareness of personal responsibility for the development of the organization,
- teamwork – shaping attitudes emphasising determination in pursuing the goals set and focusing on a high level of task implementation and success,
- entrepreneurship – undertaking activities that strengthen self-esteem and emphasise the importance of the independence of managers in thinking and formulating opinions and judgements,
- knowledge management – applying incentives encouraging learning and supporting attitudes of openness to other people and striving to ensure the success of the organization,
- creativity – implementing organisational solutions supporting attitudes characterised by cognitive curiosity and the lack of fear of making a mistake or failing.

5. Conclusions

In modern enterprises, the key competences of managers are a particularly important resource. The constant striving to improve the key competences of managers in high-tech enterprises by shaping their attitudes in line with the organisations' expectations should be treated as a specific organisational challenge on which members of companies should focus their activities. These activities may contribute to increasing the efficiency and competitiveness of Polish enterprises in the high-tech sector. The research results show that the key competences of creativity, knowledge management and entrepreneurship are the most highly evaluated of the surveyed attitudes of managers (the lowest gap). A disturbing phenomenon is the relatively low assessment of the attitudes (a large gap) characterising the key competences of basing communication systems on modern information technologies, innovation and cooperation in relational systems. In terms of these key management competencies, the attitudes of

management personnel show the largest gap. The discrepancy between the assessments of these attitudes made by strategic managers and tactical and operational managers can be interpreted as a gap that requires taking priority and particularly intensive actions aimed at shaping the expected attitudes. The presented research results about the attitude gap are part of a wider research project aimed at identifying and assessing the level of key competences of managers employed in high-tech enterprises. As part of the research project, an attempt was also made to identify and evaluate the remaining components of key competences, that is, the skills and knowledge of managers in the high-tech sector.

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