



Do leadership behaviours, work environments and the health of managers in Sweden and outside Sweden differ?—a study of a large international mining company

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Received: 7 September 2022 / Accepted: 23 March 2023 / Published online: 12 April 2023
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Abstract

The mining industry faces specific challenges related to the working conditions and safety of employees. Studies indicate that the leadership behaviours, working conditions and health of managers are of importance for the working conditions and health of subordinates. Therefore, the aim here is to study these factors in a large international mining company with its head office in Sweden. The specific focus is on identifying similarities and differences that may exist between managers in Sweden and managers outside Sweden. An online survey with validated questions has been distributed to all managers in the company. The main findings are that both managers in and outside of Sweden report relatively high values regarding relation-, structure- and change-oriented leadership behaviours. In addition, managers also rated HEL (healthy and effective leadership) behaviours with relatively high values. The managers in Sweden rate relation orientation with the highest value and the managers outside Sweden rate structure orientation with the highest value. These differences have been confirmed by a regression analysis that identified significant associations between the group of managers based outside Sweden and higher structure orientated leadership behaviours. Both manager groups rate relatively high values regarding job satisfaction and self-rated health. However, they rate relatively high work demand values. The main conclusions are that there are different patterns in leadership behaviours between these two manager groups that can be related to cross-culture factors. Further investigation of the reasons for these differences is important in this industrial sector.

Keywords Mining · Leadership behaviours · Working conditions · Health · Culture

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Abbreviations

HEL	healthy and effective leadership
OLS	ordinary least squares
GLOBE	Global Leadership and Organizational Behavior Effectiveness
OSWA	Organisational and social work environment among managers

Introduction

The mining sector is an important industry globally. Because many other key sectors depend on materials from the mining industry, it is important for employment and global development (Adomako and Tran 2022; KPMG International 2022). However, despite these positive factors, with regard to social sustainable development and working conditions mining companies in Sweden and many other countries face political and practical challenges (Abrahamsson et al. 2014; Yang and Chen 2022). According to the European Commission

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(2010), the mining industry is the sector with the highest level of work-related health problems in the European Union: the most common health problems are related to physical working environment factors such as noise, chemical working hazards and ergonomic conditions (Elgstrand and Vingård 2013). The mining industry is also a sector with high levels of safety problems and occupational injuries (Lilley et al. 2013). Nevertheless, according to statistics compiled by AFA Insurance (2021), serious accidents at work in the Swedish mining industry per 1000 employed have decreased from 8.1 in the year 2017 to 6.0 in the year 2020. In addition, the working conditions of miners in Europe have to some extent transformed: from physically hard manual labour, into less physically intensive work and into high-tech equipment and machinery (Abrahamsson et al. 2014). Therefore, research concerning the organisational and social working environment in mining has increased; focused on, for example, lack of social support, information overload and stress (Johansson et al. 2010; Abrahamsson et al. 2014). According to Löw (2022), the changes in technology in this industrial sector involving digitalisation and automation have contributed to a complex situation with both negative and positive effects on employee working conditions. Extensive research demonstrates that managers' leadership behaviours and their own working conditions and health are of importance for the working conditions and health of their subordinates (Swedish Agency for Work Environment Expertise 2020). However, research considering these factors in the mining industry is not so developed (Larsson et al. 2022a). When studying different outcomes, leadership research emphasises the importance of taking situational and cultural factors into consideration (Hersey and Blanchard 1969; House et al. 2014). Therefore, this study focuses on these factors among managers in a large international mining company based in Sweden with the aim of identifying similarities and differences between managers working in Sweden and those working in other countries.

A recent review (Larsson et al. 2022a) confirmed that only nine of the 94 studies reviewed considered leadership, working conditions and health within mining industry in some way. In summary, there are few studies in the mining industry exploring the relationship between managers' working conditions and their health, leadership behaviours, and subordinates working conditions and health. However, when considering other sectors in working life, several literature reviews confirm that leadership behaviours are of great importance for the physical and psychosocial working conditions and health of subordinates (e.g. Arnold 2017; Montano et al. 2017; Inceoglu 2018; Swedish Agency for Work Environment Expertise 2020), the performance outcomes of subordinates, as well as for quality and efficiency in organisations (Arvonen and Petterson 2002; Larsson 2010; Yukl 2013). A focus in leadership research has

been to study the relationship between different theoretical approaches, for example, transformational leadership, supportive leadership, and the three-dimensional model of leadership (Sellgren et al. 2008) and the health and working conditions of subordinates. In this study, we use the latter model together with the HEL (healthy and effective leadership behaviour) model. The three-dimensional model consists of behavioural dimensions related to employee/relation, production/task and change orientation (Ekvall and Arvonen 1991). The HEL model, developed by Larsson and Vinberg (2010), consists of different groups of leadership behaviours that have been found in organisations with high levels of employee health and organisational quality and efficiency outcomes. Studies also indicate relations between the health and working conditions of managers and their leadership behaviours (Skakon et al. 2010; Byrne et al. 2014; Joseph et al. 2015; Kaluza et al. 2020) and the health and working conditions of subordinates (Skakon et al. 2010; Skogstad 1997; Lundqvist et al. 2012).

This study focuses on cross-cultural aspects of leadership behaviours in a large international mining company based in Sweden through studying managers operating both in Sweden and in other countries. Leadership behaviours, the organisational and social work environment as well as the health of managers are investigated. To our knowledge, there are few studies considering these issues in the mining industry. The following research questions are addressed:

- What is the extent of relation-, structure- and change-oriented leadership behaviours, and healthy and effective leadership behaviours (HEL) among mining managers in Sweden and other countries?
- Which factors can explain the potential differences in leadership behaviours among these two groups of managers?
- Are there any differences concerning the level of work demands, work hours, job satisfaction and self-rated health between the two groups of managers?

Leadership behaviours and culture

Cross-cultural research on leadership has demonstrated that it is important to consider variations in managerial leadership that depend on different cultures or regions of culture (Chhokar et al. 2008; Javidan and Dastmalchian 2009; House et al. 2014). Research regarding cross-cultural aspects clearly demonstrates that societal culture affects leadership behaviour and the effectiveness of different leadership styles when subordinates are relatively culturally homogenous (Hanges et al. 2016). This is consistent with early research regarding the importance of considering situational variables when studying leadership behaviours (Vroom and Jago 2007). Reviews indicate that leadership theories developed

and tested in one culture may not apply to other cultures (Zeeraak 2022). When studying the effects of culture on leadership, two different types of analysis are common: the relationship between organisational culture and leadership, and the relationship between national culture and leadership (Javidan and Dastmalchian 2009; Zeeraak 2022). The primary focus in this study is the latter type of analysis, although organisational culture can affect the leadership behaviours, organisational and social work environment, and the health of managers.

Several researchers have discussed different dimensions for understanding cultures. Hofstede's (2011) framework is one of the most cited including the dimensions of individualism-collectivism, uncertainty avoidance, power distance, masculinity-femininity and long-term orientation. However, this framework has also been criticised regarding measurement and validity of cultural dimensions (Scandura and Dorfman 2004; Alipour 2019). The GLOBE (Global Leadership and Organizational Behavior Effectiveness) theoretical model (Chhokar et al. 2008; House et al. 2014) has proposed a development of Hofstede's model with a theory linking culture, leadership and organisational effectiveness. The theory relates national culture to leadership behaviours and organisational processes, as well as how culture affects human welfare outcomes. Researchers in the GLOBE project have based their work on surveys completed by managers in 1015 companies in 24 countries categorised into clusters based on nine cultural dimensions. Six leadership profiles have been proposed as a way to compare how different country clusters rate leadership (House et al. 2014 p. 89). The charismatic/value-based type inspires their subordinates with a desirable and realistic vision and is viewed as sincere and credible because of their integrity and willingness to sacrifice their own self-interest. Team-oriented managers are loyal to their teams and care for the welfare of their team members. Participative managers believe that subordinates can contribute to decision-making and be engaged in the implementation processes. Humane-oriented managers are unpretentious, show humility and are empathetic and support team members by offering resources and assistance. Autonomous managers have extreme confidence in their own abilities and lack respect for others' abilities and ideas. Self-protective managers have a deep desire to succeed among a group of colleagues. In the GLOBE project, ten clusters of countries have been identified. In our study, the managers in Sweden belong to the Nordic Europe cluster and the managers outside of Sweden to the Anglo cluster (UK and USA) and the Germanic Europe cluster (Germany and the Netherlands).

Previously, in an earlier review, House et al. (1997) noted that cultural differences accounted for a significant proportion of variance in both preferred leadership behaviours and actual leadership behaviours. Several studies within the

GLOBE project have found clear differences in leadership dimensions between different countries (House et al. 2014). In the Anglo cluster, for example, charismatic/value-based, participative and humane-oriented leadership styles are rated at a high level and self-protective style at a low level. In the Germanic Europe cluster, charismatic/value-based, participative and autonomous leadership styles are rated at a high level and self-protective style at a low level (Ibid.). In the Nordic Europe cluster, charismatic/value-based and participative leadership styles are rated at a high level and self-protective style at a low level (Ibid.).

In regard to the countries in the Anglo cluster, managers in the USA tend to use one of the following five leadership styles: directive, participative, empowering, charismatic or celebrity (Taleghani et al. 2010). According to these authors, the culture is individualistic, and the managers believe they can control the environment and what happens in it. Managers in the UK are likely to delegate tasks and responsibility to subordinates, are comfortable in their management role and like to make independent decisions. In regard to the Germanic Europe cluster, managers in Germany rate high on setting directions for the future, ideas are valued against past experiences, and plans are made after careful consideration of the implications of the possible outcomes of decisions. Managers in the Netherlands are characterised as the most independent decision-makers and the least likely to accept rules and decisions made by others. They have moderate concern of the needs of others and invest a great deal of energy on marketing and implementing their own ideas (Ibid.).

In regard to the Nordic Europe cluster, managers in Sweden have a distinct people and team orientation, are friendly, care for subordinates and focus on building supportive relationships. They use a group-oriented decision-making style and consider input and advice from subordinates. In addition, they consider themselves to be innovative and are comfortable in fast-changing environments (Ibid.). In a comparison of the characteristics between managers from different countries using data from the GLOBE study, Holmberg and Åkerblom (2007) found that managers in Sweden are characterised to a greater extent than others by team orientation and participation, ability to build, integrate, coordinate and maintain work teams where members cooperate in a collegial and equal way. In addition, they considered that self-protection—that is being self-centred and status-conscious—counteracts good leadership to a greater degree than managers in other countries do. Managers in the Nordic Europe cluster value employee involvement in making and implementing decisions more than managers in the other clusters of countries do (Brodbeck et al. 2000).

In summary, research about leadership behaviours in the mining industry has focused primarily on safety outcomes and there is a lack of studies concerning leadership

behaviours and managers working conditions and health. Cross-cultural research indicates both similarities and differences between leadership behaviours in different country clusters and countries within each cluster. Managers in Sweden appear to focus more on relation-oriented leadership behaviours than managers in the Anglo and the Germanic Europe cluster.

Materials and methods

Study population and sample

The data for this cross-sectional study were collected within the project Organisational and social work environment among managers (OSWA) at a large mining industry in Sweden (Larsson et al. 2022a). The company is one of Sweden's oldest industrial companies and is wholly owned by the Swedish state. The company is an international mining and minerals group with its headquarters in Sweden that provides sustainable iron ore, minerals and special products. It has around 5000 employees in 12 countries.

The study is based on an online survey that was sent to all managers in 8 countries in the autumn 2021. The survey included 48 validated self-rated questions about background variables, psychosocial working conditions, health and leadership behaviours. The survey was answered by 217 managers in Sweden (response rate: 63%) and 27 managers in other countries (response rate: 57%). The countries for the managers not in Sweden were the UK ($n = 21$), the USA ($n = 1$), Germany ($n = 2$) and the Netherlands ($n = 3$). In the GLOBE project, the UK and the USA were included in the Anglo cluster, Germany and the Netherlands in the Germanic Europe cluster and Sweden in the Nordic Europe cluster (Brodbeck et al. 2000). A non-response analysis confirmed that the response rate is at an approved level from a statistical perspective and therefore contributes to relevant knowledge about the total manager population as well as managers operating in Sweden and managers operating in the other countries. However, there are some systematic distortions in the data material with significant differences regarding response rates between different manager categories within the manager populations (Larsson et al. 2022a). Therefore, it is necessary to control for this variable when performing ordinary least squares (OLS) regressions. In the following text, the managers from the Anglo and Germanic Europe cluster are called managers outside Sweden.

In Table 1, characteristics of the two groups of managers are presented. There are significant differences between the groups concerning age, education level, managerial experience and managerial position. There were no significant differences concerning sex between the managers in and outside Sweden.

Measures

Based on the survey questions, variables were established for indicators of the managers' education level, working conditions, health and leadership behaviours. The background variables used are sex (men, women), age (years), education level (university level, upper or no secondary education) and managerial position (production manager, group manager, section manager, department manager and chief of staff). Questions about education from university/college and received leadership training (have, have not), work environment training (have, have not) and human resource training (have, have not) were also asked.

Leadership behaviours were measured with six one-item questions assessing the overall orientation of managers towards relations, tasks and change according to the taxonomy in the three-dimensional model (Ekvall and Arvonen 1991; Yukl 2013) and usage of behaviours in the HEL (healthy and effective leadership behaviour) model was measured by 18 questions (Larsson and Vinberg 2010). The three-dimensional leadership behaviour theory has been used in several research studies. The dimensions relation and structure have been tested empirically since the 1940s. The change dimension was introduced in the 1990s (Ekvall and Arvonen 1991; Yukl, 2013). The HEL model (Larsson and Vinberg 2010) complements the three-dimensional model by including questions related to groups of common leadership behaviours: a strategic and visionary leadership role, communication and information, authority and responsibility, a learning culture, subordinate conversations, plainness and simplicity, humanity and trust, walking around, and reflective personal leadership (Ibid.).

The managers were asked to read descriptions of core behaviours in each dimension and assess the extent to which they practised these behaviours in their daily work on a scale ranging from 0 (completely disagree) to 10 (completely agree). Relation-oriented leadership behaviours included questions about how to provide support and encouragement to subordinates, express conviction that a subordinate can accomplish a difficult task, recognise achievements, provide coaching when needed, discuss, advise and keep subordinates updated in decision-making processes, and handle conflicts in a constructive way. An index for this behaviour was constructed (scale 0–60) with a Cronbach's alpha of 0.78.

Structure-oriented leadership behaviours consisted of questions about how to organise work activities to increase efficiency, distribute work to groups or individuals in a clear way, clarify what results are expected for a specific task, set clear goals, explain rules, policies and procedures in the workplace and how to steer and coordinate work activities in a clear way. The scale for this index was 0–60 and Cronbach's alpha was 0.87. Change-oriented leadership behaviours included questions about how to discover opportunities

Table 1 Characteristics of the study population stratified as managers in Sweden ($n = 216$) and managers outside Sweden ($n = 27$)

	Managers in Sweden <i>N</i> (%)	Managers outside Sweden <i>N</i> (%)
Sex		
All	216 (88.9)	27 (11.1)
Men	151 (70)	18 (67)
Women	65 (30)	9 (33)
Age		
≤35 years	25 (11.5)	0
36–50 years	104 (47.9)	11 (40.7)
≥51 years	88 (40.6)	16 (59.3)
Average age	47.1**	52.4**
Education level		
University level	56%*	74%*
Upper or no secondary education	44%*	26%*
Managerial experience in the company		
0–2 years	27%**	4%**
3–5 years	23%**	37%**
6–10 years	28%**	19%**
>10 years	22%**	40%**
Managerial position		
Production manager	39%**	15%**
Group manager	13%**	12%**
Section manager	32%**	12%**
Department manager	11%**	46%**
Chief of staff	6%**	15%**

Chi² test: * = 0.05, ** = 0.01

and threats for the business, interpret events to detect the need for change, study competitors, encourage subordinates to look at problems and opportunities, discover new opportunities and test new ways of working to achieve organisational goals. The scale for this index was 0–60 and Cronbach's alpha was 0, 86. The HEL index consisted of questions concerning, for example, how to create understanding about where the organisation is going, regular workplace meetings, delegation of responsibilities and power to subordinates, how to give positive and negative feedback, encourage subordinates to make decisions, how to create a positive culture and interact with subordinates by walking around and talk to the subordinates. The constructed index for this behaviour had a scale 0–180 with a Cronbach's alpha of 0.87. In each index, no item scored below 0.7 indicating that the items are interrelated with internal consistency measuring relevant aspects of leadership behaviours (Streiner 2003).

In regard to the organisational and social work environment, work demands were measured by the single-item question: "Do you have so much to do that you have to cut back on your lunch break, work overtime or bring work home with you?" (yes = every day or a couple of days per week). Work hours were also measured by the single-item question: "How many hours per week do you normally work in

your primary gainful employment?" (hours). Likewise, job satisfaction was measured by the single-item question: "On the whole, how satisfied are you with your job?" (scale in five steps from dissatisfied to satisfied). These measures are used in a national survey by the Swedish Work Environment Authority (2020). Self-rated health was measured by the single-item question: "In general, how would you rate your health?" (scale in five steps from poor to very good). This question has been widely used as an epidemiological instrument to predict different health-related outcomes (Loren et al. 2020).

Statistical analysis

The analysis was structured in the following way. First, the distribution of background variables for managers in Sweden and managers outside of Sweden was analysed; statistical differences between the two managerial groups were tested with chi². The next step involved the distribution of relation-, structure- and change-oriented leadership behaviours and HEL behaviours among the two manager groups. This was followed by OLS regressions for the four leadership behaviour indices with bivariate analysis, as well as an analysis controlling for background variables related to age, sex,

managerial position, number of employees and education levels concerning leadership and work environment.

Results

Leadership behaviours

Table 2 displays the descriptive results regarding how the managers assess their different leadership behaviours. Managers in Sweden rate relation-oriented behaviours with the highest value, followed by structure and change orientation. Managers outside Sweden rate structure orientation with the highest value, followed by relation and change orientation. There is a significant difference between the groups concerning structure-oriented behaviours in that the managers outside Sweden rate a higher value concerning this behaviour. The values are relatively high for all three behaviours in both groups of managers. The index for HEL is also high for

both groups, with a higher value among managers outside Sweden, although not at a significant level.

In Table 3, the significant differences in separate questions within the indexes can be seen. The values in relation-oriented leadership behaviours are relatively high for both groups of managers in all six questions. There are significant differences between the groups in response to two of the questions. The Swedish managers place high value on behaviour concerning socialisation and building relations with subordinates. The managers outside Sweden place a much higher value on behaviour concerning resolving conflicts in a constructive way.

The values regarding structure-oriented leadership behaviours are relatively high in both groups. The managers outside Sweden reported higher values for all six questions than managers in Sweden. With significant differences in the values reported for four questions: how to distribute work in a clear way; clarify what results are expected; set clear goals; and coordinate work in a clear way.

Table 2 Relation-, task- and change-oriented leadership behaviours and HEL behaviours stratified between managers in Sweden ($n = 216$) and managers outside Sweden ($n = 27$). Mean, standard deviation (SD) and confidence intervals (CI)

	Managers in Sweden			Managers outside Sweden		
	Mean	SD	CI	Mean	SD	CI
Relation (0–60)	49.07	5.92	48.07–49.77	48.31	5.22	46.20–50.42
Structure (0–60)	45.00**	7.45	44.01–46.15	49.48**	5.44	47.10–51.52
Change (0–60)	43.07	9.38	41.66–44.33	45.15	8.16	41.76–48.47
HEL (1–180)	148.76	17.06	146.51–151.35	150.15	15.17	143.83–156.32
<i>N</i>	216			27		

T-test: ** = 0.01

Table 3 Significant differences in separate items in relation-, structure- and change-oriented leadership behaviours and HEL behaviours among managers in Sweden ($n = 216$) and managers outside Sweden ($n = 27$). Mean and *t*-test

	Managers in Sweden	Managers outside Sweden
<i>Relation-oriented leadership behaviour</i>	Mean	Mean
I socialise with my employees to build relationships	8.11***	6.37***
I help resolve conflicts in a constructive way	8.06*	8.50*
<i>Structure-oriented leadership behaviour</i>		
I distribute work to groups or individuals in a clear way	7.41***	8.37***
I clarify what results are expected for a specific task	7.44***	8.41***
I set clear goals	7.47**	8.30**
I steer and coordinate work activities in a clear way	7.35**	8.33**
<i>Change-oriented leadership behaviour</i>		
I monitor the world around us to discover opportunities and threats for our business	6.41**	7.52**
<i>HEL model</i>		
I have regular workplace meetings	7.73***	9.00***
I give both positive and negative feedback in a constructive way	7.89**	8.48**
I give my employees a great deal of influence in the performance of their duties	9.12**	8.59**
<i>N</i>	216	27

T-test: * = 0.05, ** = 0.01, *** = 0.001

Both groups of managers report relatively high values for most of the six questions regarding change-oriented leadership. Monitoring the world around them to discover opportunities and threats for their business is valued significantly higher by the managers outside Sweden.

A large number of the 18 questions included in the HEL model are rated on relatively high levels. Eleven behaviours vary between 8.18 and 9.14 among the managers in Sweden, and 13 behaviours vary between 8.15 and 9.00 among the managers outside Sweden. Having regular workplace meetings and giving positive and negative feedback in a constructive way received significantly higher values from the managers outside Sweden than from the managers in Sweden, whereas giving the subordinates a great deal of influence in the performance of their duties is valued to a significantly higher degree by managers in Sweden.

Table 4 presents separate OLS regressions for relation-, structure- and change-oriented leadership and the HEL index when controlling for the background variables of age, managerial position and education level related to leadership and working environment. In model 1, bivariate relationships demonstrates that managers outside Sweden have a significantly higher level of structure-oriented leadership behaviour (B -coefficient = 4.49). When controlling for the background variables of age, managerial position and education levels related to leadership and working environment, the significant relationship remains (B -coefficient = 3.85). In addition, managers outside Sweden report a lower level of relation-oriented leadership behaviours and a higher level of change-oriented leadership behaviours, although these relationships are not significant.

The results also display a significant association between the higher age of the managers and more structure-oriented

leadership. In regard to a pronounced change-oriented leadership behaviour, there are significant relationships with a higher age of the managers, a high managerial position and a higher work environment education level. There were no significant relationships in regard to the HEL behaviours. Analysis of the background variables of education level, number of employees and sex were also tested in OLS regressions but did not contribute with significant effects (results not shown in Table 4).

Education, organisational and social work environment, and health

In Table 5, descriptive results related to different education and training initiatives for the managers concerning leadership, work environment and human resource are presented. A significantly larger proportion of the managers in Sweden have had these forms of education and training compared to managers outside Sweden. The most common initiatives are related to leadership and work environment. Several managers also have different combinations of education and training. These results together with the managers' educational level presented in Table 1 confirm that the managers in both manager groups are relatively well educated.

It can be seen in Table 6 that around half of all managers in both groups experience high work demands that require them to cut back on their lunch break, work overtime or take work home. On average, the Swedish managers work 40.69 h per week and the managers outside of Sweden work 41.96 h. In relation to job satisfaction (being satisfied/somewhat satisfied), the managers in Sweden report a higher value. The values for self-rated health (very good/good) are similar

Table 4 OLS regression. Managers' relation, structure and change orientation and HEL behaviours. B -coefficients (unstandardised coefficients) and beta-coefficients (standardised coefficients, in brackets)

	Relation-oriented		Structure-oriented		Change-oriented		HEL index	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	49.8	46.23	40.5	32.1	41.0	31.5	147.4	137.6
Managers outside Sweden ^a	-0.75 (-0.04)	-1.22 (-0.06)	4.49*** (0.19)	3.85* (0.16)	2.08 (0.07)	0.51 (0.02)	1.39 (0.03)	0.53 (0.01)
Age		0.05 (0.07)		0.18** (0.21)		0.17* (0.16)		0.14 (0.07)
High managerial position ^b		0.98 (0.07)		-0.61 (-0.03)		3.32* (0.15)		2.01 (0.05)
Leadership education ^c		1.56 (0.11)		0.44 (0.03)		1.68 (0.08)		4.12 (0.11)
Work environment education ^d		0.47 (0.04)		0.78 (0.05)		2.44** (0.13)		0.92 (0.03)
R^2 adjusted	0.003	0.011	0.030	0.063	0.001	0.062	0.004	0.001

Significant values in bold style

^aReference: managers in Sweden; ^breference: lower managerial position; ^c, ^dreference: no education

*** $P = 0.001$, ** $P = 0.01$, * $P = 0.05$

Table 5 Education and training initiatives related to leadership, work environment and human resource (HR) issues stratified on managers in Sweden ($n = 216$) and managers outside Sweden ($n = 27$) (response alternatives: yes/no)

	Managers in Sweden <i>N</i> (%)	Managers outside Sweden <i>N</i> (%)
Leadership	80%**	56%**
Work environment	47%*	30%*
Human resource	14%**	0%**
Leadership and work environment	32%*	15%*
No education related to leadership, working environment and human resource	12%*	30%*

* = 0.05, ** = 0.01

Table 6 Work demands, work hours, job-satisfaction and self-rated health stratified on managers in Sweden ($n = 216$) and managers in other European countries ($n = 27$)

	Managers in Sweden <i>N</i> (%)	Managers outside Sweden <i>N</i> (%)
High work demands	59%	56%
Work hours	40.69	41.96
Job satisfaction	86%	77%
Self-rated health	80%	81%

between the groups. None of the differences between the two groups in these variables is significant.

Discussion

This study examines manager's self-rated leadership behaviours, organisational and social work environment, and health in the mining industry with a cross-country culture approach. This is an important study because of the limited research considering these factors as well as the importance existing research considering leadership behaviours places on situational and cultural factors related to national culture (Javidan et al. 2009; Zeerak 2022). In this study, the three-dimensional model (Ekvall and Arvonen 1991; Yukl 2013) and the HEL model (Larsson and Vinberg 2010) are used in an analysis of different leadership behaviours. These models have displayed high validity and reliability.

The main findings in this study are that all the managers, both in and outside of Sweden, report relatively high values regarding all three leadership dimensions (relation, structure and change). When compared to a Swedish study of the transport sector by Larsson, Jahncke and Vinberg

(2022b), the mining managers report a similar level of relation-oriented leadership dimensions and higher values of structure- and change-oriented leadership dimensions. All the managers also report high values relating to the HEL behaviours (Larsson and Vinberg 2010). These results also indicate higher values among the mining managers compared to managers in other Swedish workplaces (Larsson 2017). The high level of values regarding all three dimensions are a positive result because research demonstrates that relation, structure and change orientation are needed in successful leadership. A universal result in research studies of leadership behaviours is that a strong relation-oriented focus is positive for several outcomes such as employee health, job satisfaction and performance, and productivity and efficiency in organisations (Larsson and Vinberg 2010; Yukl 2013). In addition, according to research, a relation-oriented leadership behaviour can influence subordinate health both directly and indirectly. The latter by affecting, for example, organisational climate (Tafvelin et al. 2011), meaningfulness and the level of role conflicts (Nielsen and Daniels 2012). Studies in the mining industry and other "heavier industries" also confirm that the relationship-oriented component in leadership is positively related to and contributes to good outcomes regarding safety and accident risks (Grill et al. 2017; Maximo et al. 2019).

A leadership orientation towards structure and change is also important, and these levels depend on the context in which the manager operates. For example, some situations can require a higher degree of structure orientation to bring order to a business or to initially instruct subordinates to achieve the right level of quality, whilst other situations can require a higher degree of change orientation. The mining company participating in this study is currently working with shifting the main product from iron ore pellets to iron sponge and increased digitalisation of work activities. It can be assumed that these changes implicate the need for high levels of change orientation, even higher than the present level.

When looking at differences in leadership behaviours between managers in Sweden and managers outside Sweden, the managers in Sweden rate relation orientation with the highest value, followed by structure and change orientation. The managers outside Sweden rate structure orientation highest, followed by relation and change orientation. The OLS regression results confirm those results, identifying significant associations between the manager group outside Sweden and structure-orientated leadership behaviours. This result remains when controlling for background variables related to age, managerial position, education levels, number of employees and sex. The OLS regressions did not show significant differences between the groups for the behaviours of relation and change orientation.

The fact that the managers outside Sweden rate significantly higher values compared to managers in Sweden regarding the distribution of work, clarifying expected results, setting clear goals and coordinating work in a clear way indicates more structure-oriented behaviours. Managers outside Sweden also focus more on resolving conflicts among subordinates and on discovering opportunities and threats for their businesses than the managers in Sweden. In addition, managers outside Sweden rate having regular workplace meetings and giving feedback to subordinates significantly higher than the managers in Sweden. Managers in Sweden express a stronger behaviour concerning socialisation and building relations with subordinates and giving subordinates possibilities to influence their own working conditions. These results are in line with other research considering the influence of country-cultural conditions on leadership behaviours (Javidan and Dastmalchian 2009; House et al. 2014). Several studies confirm that to a larger extent than managers in many other countries, managers in Sweden encourage subordinates to be involved in business decisions, focus on team orientation and coordinate, and maintain work teams where members cooperate in a collegial and equal way (Holmberg and Åkerblom 2007; Taleghani et al. 2010). Research conducted in several other European countries indicates that managers are more structure- and change-oriented. For example, they focus more on analysis and plans, are more independent decision-makers and more authoritarian in their leadership (Taleghani et al. 2010).

In this study, the managers outside Sweden represent countries in the Anglo cluster and the Germanic Europe cluster (House et al. 2014). According to Taleghani et al. (2010), managers in the former cluster, which are the dominating group among the managers outside Sweden, are more individualistic, apply control of subordinates and like to make independent decisions. Managers in the latter cluster are different: Germanic managers are structure-oriented focusing on the importance of plans and in-depth analysis of company conditions, whilst managers in the Netherlands apply less structure-oriented behaviours and like to make their own decisions (Ibid.). However, when considering the cultural dimensions developed in the GLOBE project (House et al. 2014), in our study there are small differences between managers in Sweden and managers outside Sweden. Managers in both groups report high levels of charismatic/value-based and participative leadership styles and low values of self-protective styles. The differences are that the managers in the Anglo cluster also report high values on humane-oriented leadership, and managers in the Germanic Europe cluster report high values of autonomous leadership styles. The above-mentioned differences between country clusters may partly explain the differences identified in this study, although the participating managers outside Sweden represent different countries. In addition, it is important to

note that organisational culture factors in the company where this study was conducted can have an influence on the levels of the managers' ratings of their own leader behaviours and work environment as well as health outcomes. According to several researchers, both national culture and business culture affect the behaviour of individuals within an organisation (Arun et al. 2020).

The results from the OLS regressions showing that age is associated with a higher level of structure and change orientation, and that age, a high managerial position and the level of working environment education and training are associated with a higher level of change orientation may also indicate the influence from other factors rather than country-specific factors. It can be hypothesised that older managers implement less relation-oriented leadership behaviours, and that high levels of education and training experience and high managerial position contribute to a higher level of change orientation. These results are in line with the results of interviews with young Swedish managers in the investigated mining industry, illustrating that they have a will for prioritising relation-oriented behaviours (Larsson et al. 2022a). The fact that managers in Sweden report a higher level of education and training related to leadership, working environment and human resource issues may, together with the country culture aspects, contribute to a higher level of relation-oriented leadership.

Several studies indicate that the organisational and social work environment of managers is affected by a heavy workload as well as high and conflicting work demands. However, positive conditions are high flexibility and high job control with possibilities to influence your own working conditions (Yukl 2013). Both the managers in Sweden and the managers outside Sweden report a relatively high level of work demands. Although this level is similar to that of managers in other sectors in Swedish working life, the levels are higher compared to a randomly selected sample of employees in Sweden (Swedish Work Environment Authority 2020). In regard to self-rated health, both groups of managers report self-rated health at a similar level as the working population in Europe (EWCS 2015). The managers in Sweden report a higher level of job satisfaction compared to the managers outside Sweden, although not at a significant level. Both groups report a higher level of job satisfaction compared to a randomly selected sample of employees in Sweden (Swedish Work Environment Authority 2020).

Strengths and limitations

The present study has both strengths and limitations that should be acknowledged. A strength for comparing the influence of cross-cultural aspects on managers is that they work in the same mining company. However, this can also be a weakness for the generalisability of these results to other

companies in the mining sector as well as other “heavier industry”. Another strength is that the survey questions have been used in several earlier studies with validated questions and indices. The leadership behaviour indices show Cronbach’s alpha values between 0.78 and 0.87: indicating satisfactory internal consistency. That the survey has been distributed to all managers in the company is also a strength. The response rate of 63 and 57% in the two manager groups can be seen as satisfactory compared to other studies and the non-response analysis indicates that the response rate is acceptable for performing statistical analyses.

One limitation is that all of the data is self-reported. This suggests that we cannot be completely certain that the differences between the manager groups that are identified relate to actual differences in leadership behaviours. Another limitation is that the cross-sectional sample renders it impossible to derive casual relationships between the variables studied. However, we do not regard this as a major limitation because the focus of this study is on differences between groups of managers. A third limitation is the small sample of managers outside Sweden; however, it is still of relevance to compare the two manager groups regarding patterns in leadership behaviours, work environment and health. That the managers outside Sweden represent two country group clusters with some differences regarding national culture and common leadership dimensions is also a limitation. In future studies, it is important to compare mining managers in Sweden with more pure country clusters.

Conclusions and implications

The results indicate relatively high self-rated levels of relation-, structure- and change-orientated leader behaviours and HEL behaviours among both managers in Sweden and managers operating outside of Sweden. The patterns among these groups of managers differ in that managers outside Sweden report a significantly higher level of structure-oriented leadership behaviour. The managers in Sweden report a higher level of relation-oriented leadership behaviours, although the difference is not significant. These results are in line with other research considering differences in leadership behaviours between managers in different country groups, confirming that managers in Sweden use more relation-oriented behaviours. In addition, higher age implies a higher level of structure-oriented leadership behaviours. Some previous studies support this result: confirming that young managers have aspirations to apply a more relation-oriented style rather than a strongly pronounced structure- and change-oriented style.

In regard to self-rated health and job satisfaction, both groups report relatively high levels compared to other working life groups. However, both groups report a relatively high level of work demands in line with national levels for

managers. This indicates that there is need for national and company specific improvements of the organisational and social work environment of managers. The implications of this are that targeted interventions to maintain high levels of constructive leadership behaviours, improving the organisational and social work environment of managers, particularly those related to work demands, are important. In addition, the differences between the two manager groups that have been identified should also be analysed as a base for relevant measures. One theoretical contribution is the importance of considering situational factors such as type of business and cross-cultural factors when studying leadership behaviours. In future research, it is crucial to also include other countries with larger samples and to focus on longitudinal quantitative and qualitative studies. The latter type of studies could give more knowledge about mechanisms that could explain found differences between the two manager groups.

Authors contributions All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Stig Vinberg, Joel Lööv, Mats Jakobsson and Johan Larsson. The first draft of the manuscript was written by Stig Vinberg and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding information Open access funding provided by Mid Sweden University. Funding information is not applicable/no funding was received.

Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate The study was approved by the Swedish Ethical Authority (Dnr: 2021-01392). Informed written consent was sent to all participants of the questionnaires, and additional verbal consent was obtained at the start of the interviews. Data was treated confidentially. The managers were assured that they could withdraw from the study at any time without needing to give any explanation. All data was properly stored according to the Swedish Act on Ethical Review of Research Involving Humans (SFS 2003:460, 2005).

Consent for publication All authors consent for publication.

Competing interests The authors declare no competing interests.

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