“Managers’ sustainable leadership competencies across Hungary, Kazakhstan, and Türkiye: Effects of personal, organizational, and industry factors”

AUTHORS	Anastassiya Lipovka Zoltan Buzady Kuanysh Abeshev

ARTICLE INFO	Anastassiya Lipovka, Zoltan Buzady and Kuanysh Abeshev (2025). Managers’ sustainable leadership competencies across Hungary, Kazakhstan, and Türkiye: Effects of personal, organizational, and industry factors. *Problems and Perspectives in Management*, *23*(4), 467-485. doi:10.21511/ppm.23(4).2025.34
DOI	http://dx.doi.org/10.21511/ppm.23(4).2025.34
RELEASED ON	Monday, 08 December 2025
RECEIVED ON	Monday, 18 August 2025
ACCEPTED ON	Tuesday, 11 November 2025

JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
53	1	12

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Anastassiya Lipovka (Kazakhstan), **Zoltan Buzady** (Hungary),
Kuanysh Abeshev (Kazakhstan)

MANAGERS' SUSTAINABLE LEADERSHIP COMPETENCIES ACROSS HUNGARY, KAZAKHSTAN, AND TÜRKIYE: EFFECTS OF PERSONAL, ORGANIZATIONAL, AND INDUSTRY FACTORS

Type of the article: Research Article

Received on: 18th of August, 2025
Accepted on: 11th of November, 2025
Published on: 8th of December, 2025

Anastassiya Lipovka, Ph.D., Associate Professor, School of Management and Tourism, Almaty Management University, Kazakhstan. (Corresponding author)

Zoltan Buzady, Ph.D., Habil., Associate Professor, Department of Decision Sciences, Corvinus University of Budapest, Hungary.

Kuanysh Abeshev, Ph.D., Associate Professor, School of Digital Technologies and Economics, Almaty Management University, Kazakhstan.

Abstract

Sustainable leadership has become one of the widely addressed topics over the last decade, both in business and academia. This paper examines how personal, organizational, and industry characteristics influence sustainable leadership competencies across Turkic nations and how the country variable moderates these relationships. The study utilized the results of a comprehensive leadership assessment based on managers' involvement in a business simulation, operated by artificial intelligence and rooted in scientific management. Assessment results of 1,756 managers from Hungary ($N = 695$), Kazakhstan ($N = 647$), and Türkiye ($N = 414$), employed in manufacturing and construction, education and research, finance, production and trade, information technologies, public relations and services, were analyzed. The two-step approach to structural equation modeling was implemented using Python software. The results showed that strategic and normative competences were partially dependent on managers' gender ($\beta = 1.450$, $p = 0.022$), age ($\beta = 5.678$, $p < 0.001$; $\beta = -3.587$, $p < 0.001$), tenure ($\beta = 3.767$, $p < 0.001$; $\beta = -1.898$; $p = 0.020$) and industry ($\beta = 1.194$, $p = 0.031$; $\beta = 3.092$, $p = 0.001$), whereas interpersonal and anticipatory competencies remained unaffected. The country demonstrated a significant positive moderation in the relationships associated with normative competence ($\beta = 3.260$, $p = 0.039$) and interpersonal competence ($\beta = 5.667$, $p = 0.041$). In contrast, it exhibits a noteworthy negative moderation in strategic competence ($\beta = -3.665$, $p = 0.043$) and systems thinking competence ($\beta = -3.853$, $p = 0.006$). The moderation effect between the managers' age, tenure, industry, and sustainable competencies was most pronounced in Kazakhstan, followed by Hungary, and least in Türkiye. This nuanced understanding highlights the diverse impact the country has on different aspects of competence, underscoring the importance of context in these relationships.

Keywords gender, tenure, age, sustainability, Turkic nations, cross-cultural, stakeholder management, empowerment, future orientation

JEL Classification J24, Q01

INTRODUCTION

The Sustainable Development Goals of the United Nations Organization, announced in 2015, have led to the intensification of the sustainability agenda by businesses and the growth of academic journals focused on this topic from different perspectives (Hallinger & Suriyankietkaew, 2018). Initially introduced in the educational context by Hargreaves and Fink (2004), sustainable leadership was later embedded in business management by Avery (2005). The positive impact of sustainable leadership on enterprise financial and social performance was scientifically approved in different regions of the world (Alvarez-García et al., 2022; Fauzi et al., 2025).

Conflict of interest statement:
Author(s) reported no conflict of interest

Sustainable leadership competencies are required to attain sustainable development by countries and enterprises more effectively and efficiently. Sustainable leaders have "a focus on the situation, show moral courage and high self-awareness, long-term vision, meet the needs of stakeholders, create sustainable shared value, and collective influence" (Liao, 2022, p. 6). Sustainable leadership competencies represent "complexes of knowledge, skills, and attitudes that enable successful task performance and problem solving concerning real-world sustainability problems, challenges, and opportunities" (Wiek et al., 2011, p. 204). This study is scientifically grounded in the foundational, widely cited framework of sustainability leadership competencies by Wiek et al. (2011), which synthesized prior research to systematize competencies in strategic, anticipatory, interpersonal, systems thinking, and normative domains.

Numerous empirical studies exist on the managers' competencies essential for sustainable leadership worldwide, but research findings are scarce on the Turkic countries. Despite the popularity of the topic of sustainable leadership, it remains dominated by the UK, Australian, the US, and Canadian scholarship, with inconsiderable contributions from developing states (Hallinger & Suriyankietkaew, 2018). This study expands the geography of research on this issue to three Turkic countries. The political and economic instability of recent years stimulated states to initiate alternative networks to gain more assurance and support. One of those projects is the Organization of Turkic States (n.d.), launched in 2009 and headquartered in Türkiye. Azerbaijan, Kazakhstan, Kyrgyzstan, Türkiye, and Uzbekistan are its members, while Hungary, Turkmenistan, and the Turkish Republic of Northern Cyprus have observer status. The main areas of OTS activities cover cultural, economic, political, trade, industrial, migrational, diaspora, and educational cooperation (Organization of Turkic States, n.d.).

Another challenge within the existing research is orientation for rather complicated antecedents, moderators, and mediators (Liao, 2022) in sustainable leadership competencies, with insufficient understanding of how primary variables, such as social and demographic, organizational, and industry, may impact managers' sustainable leadership competencies. The third specificity is the scarcity of field research with practicing managers, as the majority of earlier academic endeavors stemmed from an education perspective and an exploratory approach (Galleli et al., 2020).

1. LITERATURE REVIEW AND HYPOTHESES

1.1. Theoretical framework

Several frameworks of sustainable leadership competencies have been proposed by scholars so far, most of which are grounded in theory through preceding concepts analysis and based on experts from educational institutions (Brundiers et al., 2021; Dentoni et al., 2012; Ozen & Ayla, 2024). Wiek et al. (2011, p. 206) classified sustainable leadership competencies into "systems thinking competence, anticipatory competence, normative competence, strategic competence, and interpersonal competence" based on the analysis of 43 preceding journal articles, books, and research reports. Our choice of Wiek et al.'s (2011) framework is stipulated by its universal character, as the outlined proficiencies are well adjusted to any type of sustainability, starting from green planet preservation and climate change to gender equality and poverty reduction.

Most of the later research is rooted in Wiek et al.'s (2011) ideas, with little amendments by renaming, replacing, or adding a few competencies (Dentoni et al., 2012; Brundiers et al., 2021). Dentoni et al. (2012, p. 65) categorized the competencies from the previous research into "systems thinking, foresighted thinking, normative competence, embracing diversity and interdisciplinarity, interpersonal competence, action and strategic management." Brundiers et al. (2021, p. 22) slightly reshaped Wiek et al.'s (2011) set and proclaimed "systems thinking, future thinking, values thinking, strategic thinking, and interpersonal competence." Based on the interviews and focus groups with enterprise heads, Suriyankietkaew et al. (2022) added an ethical competence to the Wiek et al. (2011) list to summarize the set of SLC required for small and medium enterprises.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

1.2. Organizational, industry, and personal factors and sustainable leadership competencies

The effectiveness of professional competencies in sustainable leadership varies depending on the sector of an organization where leaders are employed; scholars relate this finding to different work environments and cultures (Knight & Paterson, 2018). Eberz et al. (2023), in their qualitative study based on Wiek et al.'s (2011) framework, declared the significance of normative competence for leaders from civil service, education, and business. Leaders possess developed normative competence as they continuously are engaged in sustainability work and must articulate the sustainability agenda (Grigorescu et al., 2023). Much research on sustainable leadership competencies is based on manufacturing firms (Diaz-Fernandez et al., 2024; Ma et al., 2019), underscoring its relevance to this industry. Since manufacturing, extraction, and construction industries are directly bound with environmental sustainability concerns due to their factual or possible harm to the planet, their leaders' normative competence should be more developed. Diaz-Fernandez et al. (2024) revealed that specialists' normative competence in the chemical and metallurgical industries mediated a positive relationship between the company's proactive sustainability and social outcome. In its turn, the education sector has played the most considerable role in sustainable leadership conceptual development, training of leaders, and mainstreaming this agenda to the public and businesses (Brundiers et al., 2021; Galleli et al., 2020).

Managers' years of service appear to be significant for their sustainable leadership competence. Knight and Paterson (2018) found that sustainability managers' experience positively impacts their work effectiveness through the development of behavioral competencies over time. Employees with longer tenure demonstrate a higher inclination to sustainable business practices than those with shorter tenure, particularly with 10 years of experience; however, workers with lesser experience also showed a positive but less considerable effect between leadership and sustainability-oriented behavior (Nagalakshmi et al., 2025). Top managers' tenure designates a higher focus on environmental sustainability: the more years in an executive role, the more dedication to sustainable leadership (Li & Maqsood, 2025; Liu, 2019). In particular, strategic thinking competence is more advanced among top managers across industries, as evidenced by the involvement of executives in simulation studies (Dragoni et al., 2011, 2014). The work experience demonstrated even more significant positive results on top managers' strategic thinking when they worked in foreign countries (Dragoni et al., 2014).

Empirical studies, grounded on surveys (Nagahi et al., 2019) and interviews (Padhi et al., 2018), evidenced a direct relationship between work/managerial experience and systems thinking. A survey of 258 experienced professionals across manufacturing, military, and service sectors concluded that work experience has a moderate positive effect on systems thinking, with a greater contribution from level of education and organizational ownership (Nagahi et al., 2022). Managers with over 20 years of experience showed the best systems thinking competence compared to their less mature peers (Nagahi et al., 2019). The study in India demonstrated that managers with longer tenure had better systems thinking skills, intensified by backgrounds in different sectors (Padhi et al., 2018).

The impact of leaders' age on sustainable leadership has varied in earlier research, depending, among other reasons, on the limited samples of some age categories and geographic regions. According to Nagalakshmi et al. (2025), who surveyed 20–50-year-old employees, older specialists aged 35 and above demonstrated higher levels of leadership and sustainability than their younger colleagues. Liu (2019) identified that age was significant for green supply chain management; the older the executive, the better the practices they demonstrated. Li and Maqsood (2025) declared the significant correlation between the CEO's age and their strategic sustainable practices in Chinese corporations. Another study in Chinese manufacturing firms identified that the more mature business leaders showed better environmental sustainability performance than their younger counterparts (Ma et al., 2019). A study among top managers of Polish furniture companies found

that older leaders outperformed younger ones in managing strategic paradoxes (Glińska-Neweś et al., 2020).

The research on the impact of age on anticipatory competence is somewhat contradictory. Managers aged 28–55 years exhibited better foresight and strategic thinking than their younger and older peers (Streufert et al., 1990). The study of hotel managers in Thailand justified no considerable deviation in strategic orientation and forecasting depending on age (Tavitiyaman et al., 2014). The study encompassing over 6,000 managers showed a continuous decline in managers' future vision: leaders in their 30s to 40s exhibited greater orientation toward the future than their older colleagues, with an abrupt decline after age 58 (Archer et al., 2025).

Another social and demographic factor critical to the present study is the gender of managers. The positive effect of gender diversity on environmentally sustainable performance was approved by Li and Maqsood (2025), but several studies reported zero gender difference (Knight & Paterson, 2018; Liu, 2019; Nagalakshmi et al., 2025). As for the subcompetences of sustainable leadership, the most considerable variations by gender were observed in normative and interpersonal skills (Buzady & Lipovka, 2024). Particularly, the women managers' stakeholder orientation became more visible during the COVID-19 pandemic (Angelakis et al., 2023; Kachniewska & Para, 2023). The content study of German public university leaders' posts resulted in identifying women's more positive and transformational appeals to their stakeholders (Angelakis et al., 2023). The employees in the hotel industry in Poland characterized women as empathetic leaders sustaining collaboration, engagement, and positive communications (Kachniewska & Para, 2023). The preceding quantitative studies in Europe and Southern America declared women's greater proneness to transformational leadership, associated with sustainable leadership and stakeholder management (Alonso-Almeida et al., 2017; Navia et al., 2019).

Women were consistently evaluated higher for their collaboration, individualized consideration, and relational behaviors (Larsson et al., 2023). Gender specificity was more obvious in relational and interpersonal domains, particularly in multisource/360° and peer assessments compared to self-reports (Hopkins & Bilimoria, 2008; Pfaff et al., 2013). The difference in social intelligence in favor of women was more significant among the most successful leaders and less observable among ordinary managers (Hopkins & Bilimoria, 2008). In the study embracing over 10,800 leaders in Sweden, women's inclination to developmental leadership was associated with trust, employee engagement, stronger teams, and long-term sustainability (Larsson et al., 2023), while U.S. men managers were assessed lower for their teambuilding skills, cultivating shared values, and collaboration activities (Jordan et al., 2025). Nonetheless, several scholars explained men's lower evaluations in relational behaviors gained in numerous earlier studies through the effect of gender stereotypes (Lipovka et al., 2021).

The geographical region, with its social and cultural features, acts as a country factor that tends to enhance or diminish managers' sustainable competencies. The critical review of research findings on the examined topic resulted in the identification of limited research on Turkic countries, their small samples, and a deficit in coverage of managers' personal, organizational, and industry factors. Several empirical studies were conducted in Hungary (Bencsik & Belas, 2024; Bencsik & Berke, 2023; Bencsik & Pangsy-Kania, 2023; Çuhadar & Rudnak, 2022), a few in Türkiye (Tezcan & Kuleyin, 2021; Yangil & Şahin, 2019), and to the best of our knowledge, no research had been directly linked to the managers' sustainable leadership competencies in Kazakhstan.

Yangil and Şahin (2019) stated that managers' competencies in Türkiye aligned with global managers' sustainable leadership competency frameworks across economic, cultural, social, and ethical aspects. Most of the Hungarian studies employed a qualitative method – semi-structured and in-depth interviews with managers from small and medium-sized enterprises (Bencsik & Belas, 2024; Bencsik & Berke, 2023; Bencsik & Pangsy-Kania, 2023). Çuhadar and Rudnak (2022), in their study among 201 mid-level managers from Hungary, defined their less advanced sustainable leadership competencies compared with conventional management.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

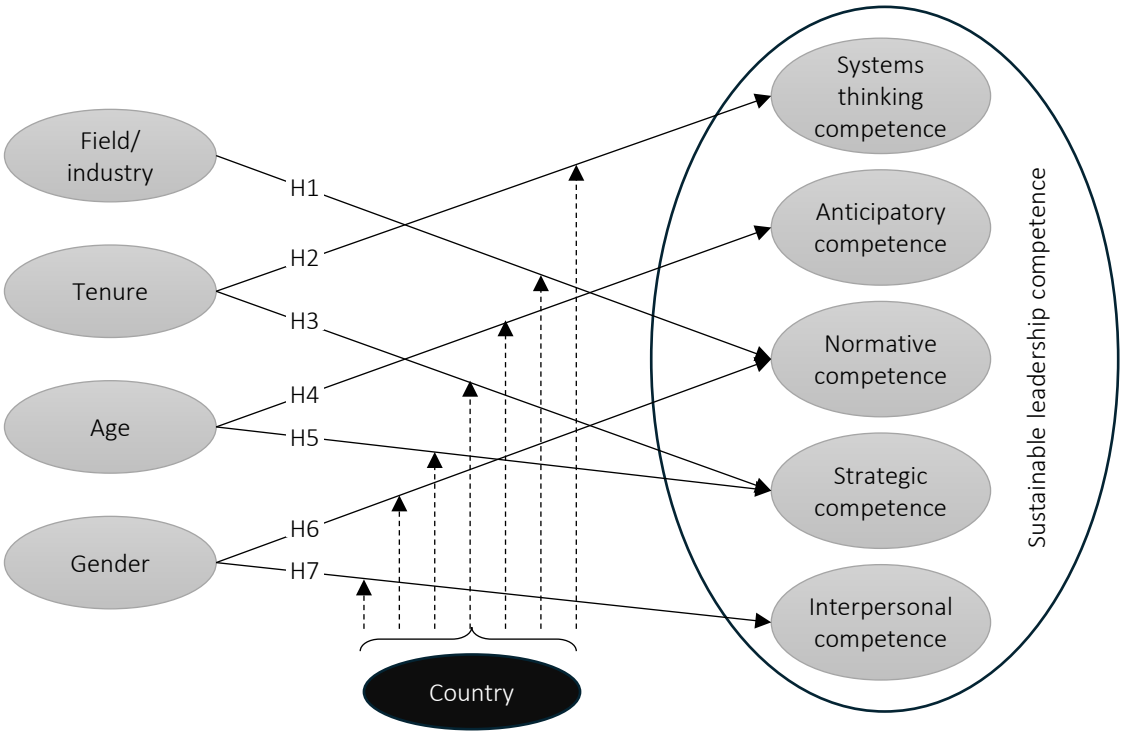

Figure 1. Conceptual model

The existing cross-cultural research from other countries mostly evidences in favor of the country's impact on sustainable leadership, however, without rigor and detailed analysis of the state as a research variable. Several robust cross-country studies have demonstrated significant effects of country-level factors, particularly national culture, governance, and economic freedom, on organizational sustainability outcomes (Hahn et al., 2025; Griffin et al., 2021), which might limit or create vast opportunities for sustainable leadership practices. Hanh et al. (2025) revealed strong causal evidence that institutional-level country variables shape manager-level sustainable decision making. The research in Central and Eastern Europe demonstrated the substantial variation among countries in managers' sustainable leadership practices, namely, the specificity of trust-building and long-term thinking (Bencsik & Belas, 2024; Remišová & Lašáková, 2015).

The conducted literature review revealed limited empirical evidence on the impact of managers' age, gender, tenure, and the company's field at the international level, as well as the scarcity of large-scale cross-country studies, particularly among Turkic states. The implemented critical analysis identified the lack of a comprehensive study of various factors affecting managers' sustainable leadership competencies.

This paper aims to examine how social and demographic, organizational, and industry factors impact managers' sustainable leadership competencies and how countries moderate these relationships. Following the aforementioned research results, the range of hypotheses has been formulated:

H1: Manufacturing, extraction, construction, and education and research sectors positively correlate with managers' normative competence.

H2: The longer length of tenure positively correlates with systems thinking competence.

H3: The longer the managerial experience, the better the leaders' strategic competence.

H4: Managers aged 30-under 60 possess more developed anticipatory competence than leaders of other age groups.

H5: Managers aged 30-under 60 demonstrate more advanced strategic competence compared to their peers of other ages.

H6: Women leaders demonstrate better normative competence than their male counterparts.

H7: Women managers exhibit better interpersonal competence compared to men leaders.

H8: Country moderates the relationships between the company's field, tenure, age, gender, and sustainable leadership competence.

The graphical visualization of the proposed hypotheses, embracing the dependent variable and independent variables, was depicted in the conceptual model in Figure 1.

2. METHODS

This study focuses on examining how personal, organizational, and industry characteristics influence sustainable leadership competencies and how country dimension moderates these links. As the first cross-cultural research on sustainable leadership competencies among Turkic nations, it extends Wiek et al.'s (2011) concept by expanding its geographical application and bringing new insights into gender, age, experience, and field variations.

Within the framework of this study, the international dataset of managers' competencies assessment resulting from playing Fligby – the science-grounded global business simulation (Wimmer et al., 2022) – was employed. A range of competencies was selected from Fligby (2024) managers' assessment as measures of the sustainability leadership competencies by Wiek et al. (2011) (Table 1). The Fligby past players database has surpassed 14,000 players from across tens of states. ALEAS Group, headquartered in the United States and the designer of Fligby (2024), granted us access to its database. Fligby represents a serious business game developed and verified by academic experts in leadership from several European institutions, including the second author of this article. The content of this business simulation is rooted in the close links between leadership, positive psychology, and sustainable development.

In accordance with Table 1, the following measures were used to assess the sustainable leadership competencies: social dynamics and analytical skills for systems thinking competence; future orientation for anticipatory competence; stakeholder management and building engagement for normative competence; strategic thinking and empowerment for strategic competence; and teamwork management and conflict management for interpersonal competence.

The assessment of leadership competencies in the simulation was run on a 100-point scale. Further, participants were grouped into three large groups based on their performance results:

1. Most effective: 100–70 points – 862 people;
2. Less effective: 69–60 points – 448 people;
3. Ineffective: 59–0 points – 446 people.

Table 1. Sustainable leadership competencies and their subconstructs

Source: Compiled based on Wiek et al. (2011) and Fligby (2024).

Wiek et al.'s (2011) sustainable leadership competencies and their definitions	The measured subconstructs
Systems thinking competence (STC) – "the ability to collectively analyze complex systems across different domains (…) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks" (p. 207)	Social dynamics (social system thinking) Analytical skills
Anticipatory competence (AC) – "the ability to collectively analyze, evaluate, and craft rich ''pictures'' of the future related to sustainability issues and sustainability problem-solving frameworks" (pp. 207, 209)	Future orientation
Normative competence (NC) – "the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" (p. 209)	Stakeholder management Building engagement (creating an environment of engagement and trust)
Strategic competence (SC) – "the ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability" (p. 210)	Strategic thinking Empowerment
Interpersonal competence (IC) – "the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" (p. 211)	Teamwork management Conflict management

http://dx.doi.org/10.21511/ppm.23(4).2025.34

The sample was collected through the practicing managers' involvement in the business simulation by the second author of this paper; the participants from Hungary, Türkiye, and Kazakhstan took part in corporate or personal training on leadership development, at the beginning of which their competencies were assessed. Participants' reactions were evaluated using an algorithm developed by academic experts across a range of simulated scenes and conversations, based on their managerial decisions in response to the situations and stakeholders' appeals. On average, leaders who constituted the sample for this study played Fligby for over five and a half hours. Every skill examined in this study was assessed 7–14 times, depending on players' virtual decisions regarding employee motivation, profit changes, and stakeholders' demands, with a strong focus on sustainability. As a rule, players make about 150 managerial decisions during the average timeline.

The participants were managers from small-, medium-, and large-sized businesses and master's program students with managerial experience. The descriptive statistics are provided in Appendix A. Since the work experience was grouped into intervals, this variable became an ordinal categorical variable and demonstrated inadequate descriptive statistics. The industry, being a qualitative (categorical) nominal variable, has not been included in Appendix A, either due to its inadequate representation. The participants' social-demographic and organizational details are given in Table 2.

Table 2. Demographics

Characteristics	Representation, in numbers	Representation, in %
Country (people)		
Hungary	695	39.6
Kazakhstan	647	36.9
Türkiye	414	23.5
Gender (people)		
Women	839	47.8
Men	917	52.2
Age (years)		
Youth (under 30)	458	26.1
Young (30–under 45)	887	50.5
Middle (45–under 60)	393	22.4
Older (60–75)	18	1
Tenure (years)		
Around a year	465	26.5
1–under 3	496	28.2
3–under 7	372	21.2
7–under 15	279	15.9
15 and above	144	8.2
Industry/Sector (people)		
Manufacturing, extraction, and construction	477	27.2
Education and research	365	20.8
Finance	256	14.6
Consumer goods, production, and trade	241	13.8
IT, computers	154	8.8
International, public relations, and administration	143	8.2
Services	116	6.6

Following Table 2, the country representation of participants was almost equal in Hungary and Kazakhstan (39.6% and 36.9% respectively), whereas around ¼ of participants were from Türkiye. Gender distribution was rather harmonious, with only around 5% of men's domination. In the Kazakhstani sample, women constituted the majority, whereas among Turkish participants, it was the other way around, and the Hungarian sample was the most balanced. The mean age of managers was 39.7 (women – 39.47 versus men – 39.9). The youth and middle-aged categories were almost equal, with young leaders (30–45) representing over half of the sample and older adults (60–75) accounting for 1%. Generally, age representation reflects the global labor market trends. As for the managerial experience, the mature leaders with above 7 years of tenure constituted 24%, in their turn, and 26.5% were less-experienced managers (around 1 year). Around 50% worked as a manager for 1 to 7 years. The industry mix was diverse, ranging from heavy industry (27.2%) – the largest – to public relations and services – the smallest (6.65%).

The results of the comprehensive evaluations represented this study dataset and were mathematically coded and utilized to test the proposed conceptual model with the assistance of Python software, version 3.11.5. This work was implemented in the paradigm of structural equation modeling (SEM), called the two-step approach to SEM / Partial SEM approach (Anderson & Gerbing, 1988). This analysis encompassed the major elements of SEM: verification of measurement models, testing of

structural dependencies between constructs, and moderation analysis; however, it was conducted through sequential regressions and factor analysis. First, the discriminant validity of the latent variables was assessed using the Fornell–Larcker criterion and composite reliability. Second, structural hypotheses were tested through multiple regressions considering moderation.

3. RESULTS

Initially, the proposed theoretical model was tested and measured for its reliability and validity. To assess the internal consistency of the scales, Cronbach's alpha (α) and composite reliability (CR) were calculated, along with the average variance extracted (AVE). The normalized factor loadings of the indicators obtained from the first main component were moderate.

In Table 3, AVE values for systems thinking, normative, strategic, and interpersonal constructs were 0.50 (√AVE = 0.707), meeting the minimum threshold for convergent validity. Cronbach's α ranged from 0.602 to 0.703, with interpersonal at the threshold. Composite reliability for multi-indicator constructs was slightly below the 0.70 guideline. For the single-indicator construct (anticipatory), α was not calculated, and its CR and AVE reflected the model's specifics, not perfect reliability. Discriminant validity was met, with √AVE values exceeding inter-construct correlations (< 0.707). The full correlation matrix is given in Appendix B. Although α and CR values are near or slightly below recommendations, they are acceptable for short scales in early validation. Convergent validity was confirmed, and discriminant validity criteria were satisfied.

Table 3. Reliability and convergent validity indices

Construct	Construct items	Item Loading	Cronbach's Alpha	CR	AVE	Sqrt (AVE)
Systems thinking	Social dynamics	0.707	0.602	0.667	0.5	0.707
	Analytical skills	0.707				
Anticipatory	Future orientation	1.000	–	1.0	1.0	1.0
Normative	Stakeholder management	0.707	0.651	0.667	0.5	0.707
	Building engagement	0.707				
Strategic	Strategic thinking	0.707	0.622	0.667	0.5	0.707
	Empowerment	0.707				
Interpersonal	Teamwork management	0.707	0.703	0.667	0.5	0.707
	Conflict management	0.707				

Table 4. Evaluation of *H1* about the impact of the industry on managers' normative competence

Variables	Corr		t-value	p-value
Stakeholder management ~ industry_cat	0.018	–0.023	–0.020	0.984
Building engagement ~ industry_cat	0.099	0.740	1.231	0.222
Stakeholder management~				
Consumer_goods_production_and_trade	–0.005	–0.206	–0.190	0.850
Education_research	0.080	3.092	3.371	0.001**
Finance	0.021	0.942	0.890	0.373
IT_computers	0.013	0.742	0.562	0.574
International_public_relations_administration	–0.006	–0.378	–0.278	0.781
Manufacturing_extraction_construction	–0.044	–1.553	–1.852	0.064
Services	–0.074	–4.641	–3.095	0.002**
Building engagement ~				
Consumer_goods_production_and_trade	–0.069	–1.893	–2.899	0.004**
Education_research	0.051	1.194	2.153	0.031*
Finance	0.075	2.007	3.153	0.002**
IT_computers	0.009	0.303	0.381	0.703
International_public_relations_administration	–0.052	–1.809	–2.200	0.028*
Manufacturing_extraction_construction	–0.005	–0.103	–0.203	0.839
Services	–0.034	–1.316	–1.453	0.146

Note: * $p < 0.05$; ** $p < 0.01$.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

Further, the sequential hypothesis testing was run in Python following the algorithms of structural equation modeling. The findings gained as a result of *H1* verification are depicted in Table 4.

Following Table 4, the general consideration of industry as a variable encompassing all the sectors did not demonstrate any influence on the normative competence since the *p*-value in both indicators is more than 0.05 (0.984 and 0.222). Meanwhile, the more precise investigation of the effect gave more sophisticated findings. The education and research sector appeared to be the most significant factor that positively correlates with the dependent variable since it impacts both building engagement (β = 1.194; p = 0.031) and stakeholder management (β = 3.092; p = 0.001). Manufacturing, extraction, and construction are insignificant for normative competence (p > 0.05), as they did not show any link with stakeholder management and building engagement. Therefore, *H1* was partially supported.

Other findings that were not hypothesized but represented additional useful information: the negative relationships were observed between stakeholder management and services (β = –4.641; p = 0.002), and goods, production and trade (β = –1.893; p = 0.004), international, public relations, and administration (β = –1.809; p = 0.028) and building engagement. Positive correlations were identified between finance and building engagement (β = 2.007; p = 0.002), and IT was not statistically significant for either subconstruct. Table 5 summarizes the results of *H2* testing.

Following Table 5, the systems thinking competence demonstrated a dependency on the years of managerial experience, neither within the accumulated values (β = 1.450; p = 0.107), nor the separate indicators: analytical skill (β = 1.880; p = 0.122) and social dynamics (β = 1.030; p = 0.329). The more specified analysis along the experience categories justified the common conclusion on insignificance, except for the considerable negative correlation between analytical skills and 1–3 years of experience (β = –1.799; p = 0.004). Therefore, *H2* was fully rejected. Table 6 summarizes the results of *H3* testing.

In compliance with Table 6, there was no justification for the significant relationship between strategic competence and managers' tenure. Considering the empowerment subconstruct, the results designated the evidence opposite to the hypothesized statement: the least mature leaders exhibited the best empowerment skills out of the whole sample (β = 3.767; p < 0.001), whereas the tenure from 1 to 3 years resulted in a significant negative relationship with the empowerment indicator (β = –1.898; p = 0.020). Consequently, *H3* was not positively attested.

Table 7 depicts the findings on the relationship between anticipatory competence measured by the

Table 5. Testing *H2* about the positive impact of the longer tenure on systems thinking competence

Variables	Corr	β	t-value	p-value
Systems thinking ~ tenure_cat	0.020	1.450	1.630	0.107
Analytical skill ~ tenure _cat	0.040	1.880	1.560	0.122
Social dynamics ~ tenure_cat	–0.010	1.030	0.980	0.329
Analytical skill ~				
Less than a year	0.002	0.046	0.072	0.943
1–3 years	–0.068	–1.799	–2.852	0.004**
3–7 years	0.027	0.794	1.139	0.255
7–15 years	0.045	1.455	1.870	0.062
More than 15 years	0.009	0.380	0.366	0.714
Social dynamics ~				
Less than a year	0.017	0.383	0.723	0.470
1–3 years	–0.043	–0.933	–1.800	0.072
3–7 years	0.039	0.932	1.632	0.103
7–15 years	0.023	0.621	0.972	0.331
More than 15 years	–0.046	–1.647	–1.937	0.053

Note: ** p < 0.01.

Table 6. Relationships between strategic competence and tenure

Variables	Corr	β	t-value	p-value
Strategic thinking~				
All tenure groups	–0.005	1.327	1.194	0.236
Less than a year	0.007	0.171	0.2755	0.783
1–3 years	–0.006	–0.164	–0.270	0.787
3–7 years	–0.011	–0.299	–0.447	0.655
7–15 years	0.033	1.028	1.3756	0.169
More than 15 years	–0.028	–1.161	–1.166	0.244
Empowerment~				
All tenure groups	–0.067	–0.736	–0.524	0.601
Less than a year	0.1079	3.767	4.5447	5.88E–06***
1–3 years	–0.055	–1.898	–2.327	0.020**
3–7 years	–0.033	–1.239	–1.377	0.169
7–15 years	–0.010	–0.428	–0.425	0.671
More than 15 years	–0.020	–1.124	–0.839	0.408

Note: ** $p < 0.01$; *** $p < 0.001$.

future orientation indicator (*H4*) and strategic competence, including strategic thinking and empowerment (*H5*).

Following Table 7, managers' age did not affect their anticipatory competence, as not only did accumulated age, but also different age categories independently not produce any effect on the dependent variable expressed in future orientation within this analysis, as their *p*-value is higher than 0.05. Therefore, *H4* on better anticipatory competence of managers aged 30–under 60 was fully denied.

As far as the strategic competence is concerned, the results were more comprehensive since youth (under 30 years old) was linked to a statistically significant positive impact ($\beta = 5.678$; $p < 0.001$) and vice versa, young specialists at the age of 30 to 45 had a significantly negative impact ($\beta = –3.587$; $p < 0.001$). The results regarding the second indicator measured within this hypothesis – strategic thinking – provide evidence that managers' age was irrelevant for strategic competence. Consequently, *H5* about the more advanced strategic competence of managers aged 30–under 60 was not supported.

Table 7. Influence of managers' age on their anticipatory and strategic competencies

Variables	Corr	β	t-value	p-value
Anticipatory competence ~				
All age groups	–0.048	0.149	1.355	0.179
Older adults	–0.016	–1.698	–0.657	0.511
Middle age	–0.026	–0.685	–1.097	0.273
Young age	–0.002	–0.047	–0.090	0.928
Youth	0.031	0.767	1.295	0.195
Strategic competence				
Strategic thinking~				
All age groups	–0.076	0.127	0.964	0.338
Older adults	–0.024	–2.726	–1.005	0.315
Middle age	–0.030	–0.834	–1.272	0.203
Young age	–0.011	–0.247	–0.451	0.652
Youth	0.047	1.215	1.954	0.051
Empowerment~				
All age groups	0.206	–0.238	–1.446	0.152
Older adults	–0.040	–6.102	–1.672	0.095
Middle age	–0.021	–0.784	–0.889	0.374
Young age	–0.116	–3.587	–4.907	1.01E–06***
Youth	0.162	5.678	6.867	9.07E–12***

Note: *** $p < 0.001$.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

Table 8. Testing correlations between managers' gender and their normative and interpersonal competencies

Variables	Corr	β	t-value	p-value
Women~Normative competence				
Stakeholder management	0.055	1.450	0.410	0.022*
Building engagement	–0.032	–0.350	–0.200	0.845
Women~Interpersonal competence				
Teamwork management	–0.024	0.730	0.350	0.730
Conflict management	0.035	1.800	0.970	0.337

Note: * $p < 0.05$.

Table 8 accumulates the research results regarding the manager's gender.

Following Table 8, gender was not statistically significant for building engagement (β = –0.350; p = 0.845), whereas the women variable positively correlated with stakeholder management (β = 1.450; p =0.022), which suggested that women demonstrated better skills in managing relationships with the company's stakeholders. The results obtained were evident in favor of *H6*, with partial support related to women's more developed normative competence.

The analysis of four sub-constructs of interpersonal competence (managing teams and conflicts) allowed us to conclude on the absence of managerial differences depending on their gender, as one of them appeared to achieve a statistically significant level of $p \leq 0.05$. Thus, *H7* about women managers' better interpersonal competencies was rejected.

The moderating variable – country – was finally examined after testing the seven preceding hypotheses on the relationships between social-demographic and organizational characteristics and the sustainable leadership competencies (Table 9).

Table 9. Testing the moderating effect of the country variable

Path details	Corr	β	t-value	p-value
Systems thinking competence				
Systems thinking~ tenure_cat *country_cat	0.089	–3.853	–2.805	0.006**
Social dynamics ~ tenure_cat * country_cat	0.074	–4.264	–2.618	0.011*
Analytical skill ~ tenure_cat *country_cat	0.076	–3.443	–1.795	0.076
Anticipatory competence				
Anticipatory ~ age * country_cat	0.089	–0.344	–1.530	0.130
Normative competence				
Normative ~ industry_cat * country_cat	0.515	3.260	2.100	0.039*
Stakeholder management~ industry_cat * country _cat	0.087	4.719	2.021	0.046*
Building engagement~ industry_cat*country_cat	0.214	1.796	1.507	0.135
Normative ~ women * country_cat	0.111	3.371	0.960	0.340
Stakeholder management~ women * country_cat	0.094	4.501	0.853	0.395
Building engagement~ women * country_cat	0.101	2.240	0.831	0.408
Strategic competence				
Strategic competence~ tenure_cat *country_cat	0.114	–3.224	–1.898	0.061
Strategic thinking ~ tenure_cat * country _cat	0.021	–3.665	–2.057	0.043*
Empowerment ~ tenure_cat *country_cat	0.154	–2.782	–1.241	0.218
Strategic competence ~ age * country_cat	0.212	–0.419	–1.635	0.106
Strategic thinking ~ age * country_cat	0.045	–0.607	–2.277	0.025*
Empowerment_age* country_cat	0.115	0.507	1.003	0.097
Interpersonal competence				
Interpersonal ~ women * country_cat	0.030	3.554	1.515	0.134
Teamwork management~ women * country_cat	0.041	5.299	1.695	0.094
Conflict management~ women* country_cat	0.077	5.667	2.071	0.041*

Note: * $p < 0.05$; ** $p < 0.01$.

In compliance with Table 9, the country variable moderates the relationships between the respondents' characteristics and sustainable leadership competencies. Significant moderation effects were established for systems thinking and tenure (β = –3.853, p = 0.006), normative competence and industry (β = 3.260, p = 0.039), strategic thinking and tenure (β = –3.665, p = 0.043) and strategic thinking and age (β = –0.607, p = 0.025), as well as conflict management within the interpersonal competence (β = 5.667, p = 0.041). Taking into account the partial but statistical significance of the country factor for all sustainable leadership competencies, except for anticipatory, *H8* was supported by the obtained results.

For a deeper exploration of *H8* results, the cross-country data analysis of Hungary, Kazakhstan, and Türkiye was implemented, and the variables demonstrated significant relationships with sustainable leadership competencies (Table 10).

Following Table 10, 5 out of 6 significant moderating effects were observed in the Kazakhstani sample, 1 effect in the Hungarian sample, and no effect in the Turkish sample. The considerable moderating effects were identified mostly within strategic competence, less in systems thinking competence, and the least in normative competence, whereas interpersonal competence remained indifferent. For a proper interpretation of the results, it is worth emphasizing that β represents the difference in slope compared to the reference country, which is identified by the base in country_cat. The sign indicates the direction of the difference, while the significance reflects the reliability of this difference.

The cross-country differences in systems thinking competence and tenure were mainly caused by Kazakhstan (β = –4.44, p = 0.022), since in Hungary (β = 0.51, p = 0.775) and Türkiye (β = 4.06, p = 0.198), the relationship of managerial experience with the examined competence was comparable to the reference country. A significant interaction between tenure and social dynamics was observed in Kazakhstan (β = –5.70, p = 0.012), whereas in Türkiye (β = 3.18, p = 0.401) and Hungary (β = 2.07, p = 0.326) the differences were not statistically significant.

Table 10. Testing the moderating effects across Hungary, Kazakhstan, and Türkiye

Path details	Corr	β	t-value	p-value
Systems thinking competence				
Systems thinking ~ tenure_cat * Hungary	0.001	0.509	0.287	0.775
Systems thinking ~ tenure_cat * Türkiye	–0.069	4.057	1.299	0.198
Systems thinking ~tenure_cat * Kazakhstan	0.090	–4.444	–2.333	0.022*
Social dynamics ~ tenure_cat * Hungary	–0.064	2.071	0.989	0.326
Social dynamics ~ tenure_cat * Türkiye	–0.053	3.176	0.843	0.401
Social dynamics ~ tenure_cat * Kazakhstan	0.116	–5.700	–2.577	0.012*
Normative competence				
Normative ~ industry_cat * Hungary	0.085	–2.298	–1.411	0.162
Normative ~industry_cat * Türkiye	–0.180	0.792	0.928	0.356
Normative ~ industry_cat * Kazakhstan	0.101	3.604	1.971	0.052
Stakeholder management ~ industry_cat * Hungary	0.115	–4.117	–1.683	0.096
Stakeholder management ~ industry_cat * Türkiye	–0.164	0.633	0.491	0.625
Stakeholder management ~ industry_cat * Kazakhstan	0.024	5.741	2.095	0.039*
Strategic competence				
Strategic thinking ~ tenure_cat * Hungary	0.035	3.112	1.395	0.167
Strategic thinking ~ tenure_cat * Türkiye	–0.054	1.399	0.340	0.734
Strategic thinking ~ tenure_cat * Kazakhstan	0.000	–5.316	–2.234	0.028*
Strategic thinking ~ age * Hungary	0.034	0.570	2.152	0.034*
Strategic thinking ~ age * Türkiye	–0.097	–1.383	–0.895	0.373
Strategic thinking ~ age * Kazakhstan	0.019	–0.619	–2.203	0.030*
Interpersonal competence				
Conflict management ~ women * Hungary	0.046	1.589	0.431	0.668
Conflict management ~ women * Türkiye	–0.075	–5.826	–1.134	0.260
Conflict management ~ women * Kazakhstan	0.054	5.952	1.287	0.202

Note: * p < 0.05.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

The relationship between stakeholder management and industry demonstrated the cross-cultural specificity within the normative competence. The variations were produced by Kazakhstan with β = 5.741 and $p = 0.039$, which was significantly stronger than in the reference. Thus, in this Central Asian republic, industry affiliation significantly determines the level of stakeholder management skills compared to Hungary (β = –4.117, $p = 0.096$) and Türkiye (β = 0.633, $p = 0.625$) with weaker and no difference from the reference, respectively.

In terms of strategic competence, both age and tenure underwent country specificity. The cross-country analysis by age uncovered that in Hungary, the managers' age positively impacted their strategic thinking (β = 0.570, $p = 0.034$), whereas in Kazakhstan this influence was negative (β = –0.619, $p = 0.030$) and insignificant in Türkiye (β = –1.383, $p = 0.373$). The Central Asian country also engendered a variation between its isolated data and the joint sample of three countries. Thus, Hungary (β = 3.112, $p = 0.167$) and Türkiye (β = 1.399, $p = 0.734$) had a positive but insignificant correlation: the length of service did not have a statistically confirmed effect. In Kazakhstan (β = –5.316, $p = 0.028$), this was the only significant negative effect, indicating a contrast in the dynamics of strategic thinking development across experience.

4. DISCUSSION

We examined the impact of managers' age, gender, tenure, and sector of employment on sustainable leadership competence, and the moderating effect of country on the relationships among these variables.

Despite most of the hypothetical statements having been rejected or just partially supported in the process of their testing, valuable findings on the relationship between personal, organizational, and industry constructs with sustainable leadership competencies were gained. The results proclaimed that four out of five sustainable leadership competencies were impacted by one or two personal or organizational variables, and the country moderated the relationships between sustainable leadership competencies and gender, industry, age, and tenure. The only subconstruct that remained fully statistically insignificant for the direct relationship and the moderator's effect was anticipatory competence, which supported Tavitiyaman et al.'s (2014) study among hospitality leaders.

The systems thinking competence appeared to be the least significant in terms of direct relationships with independent variables, but, along with it, demonstrated the most considerable effect by the country moderator. The country factor plays a negative role within systems thinking and strategic competencies and conversely makes a positive impact within interpersonal and normative competencies that extend the preceding results in other parts of the world (Hahn et al., 2025; Griffin et al., 2021). Consequently, national culture, local approaches to business leadership, management practices, economic and political regulations, and public attitudes toward sustainability might increase or decrease managers' sustainable leadership competencies across different geographical contexts.

It is worth noting that the moderator effect was less evident in the identified statistically significant individual relationships between variables but was observed between those factors that did not demonstrate any relationship in direct measurements. So, within systems thinking competence, a direct relationship was found between social dynamics and tenure, and the moderator's effect for the link between analytical skills and tenure. A similar result was obtained regarding strategic competence, in which direct relationships between tenure, age, and employee empowerment were revealed, and the country moderated the connections between strategic thinking and tenure and age. The gender variable evidenced an even more interesting result: the direct positive relationship between women and stakeholder management as a subconstruct of normative competence, and the country's positive effect on the moderation of the women and conflict management relationship. This finding displays the multifaceted nature of sustainable leadership, where competencies are complex and could be influenced rather differently by various factors that enrich the earlier findings (Eberz et al., 2023; Suriyankietkaew et al., 2022) and shed more light on the functioning of Wiek et al.'s (2011) framework in practice.

The cross-country analysis revealed that out of the three countries, Kazakhstan mostly caused the moderation effect. In this Central Asian state, the more experienced managers surprisingly demonstrated lower strategic competence and systems thinking competence (particularly, social dynamics) compared to their peers with shorter tenure. For leaders from Hungary and Türkiye, the length of service did not identify a statistically confirmed effect. The age factor had different impacts in Hungary and Kazakhstan, and no influence in Türkiye. Thus, Hungarian managers of older age showed better strategic competence than their younger colleagues, whereas Kazakhstani leaders, conversely, tended to display weaker strategic thinking with age.

The explanation of these findings might be that more formalized career trajectories in the Central European state resulted in mature managers' wider strategic roles, enriched duties, and training opportunities (Bencsik & Berke, 2023). In its turn, the negative impact of Kazakhstani leaders' maturity and longer tenure on systems thinking and strategic competence was obviously engendered by the high share of unsystematic (urgent) tasks, bureaucracy, limited opportunities for planning and analytics, and low predictability of work processes (Mahmood et al., 2020).

Remarkably, industry factors in Kazakhstan appeared to be critical for having normative competence, specifically related to stakeholder management. In the examined Central Asian country, the industry obviously assumes other requirements for interaction with regulators, customers, and partners, such as B2G, highly regulated segments, and public procurement. In Hungary and Türkiye, a more unified set of practices for interacting with stakeholders might exist, regardless of the industry (Yangil & Şahin, 2019).

Interesting findings were obtained regarding age and tenure. Contrary to the hypothesis, the youngest managers under 30 and those with around 1 year of experience demonstrated a rather strong positive tendency toward greater subordinates' empowerment, whereas their older peers aged 30-45 with 1–3 years of tenure showed an abrupt decline in this subconstruct. Within the systems thinking competence, the finding was similar in regard to the link between weaker analytical skills and a short managerial experience (1–3 years). These results contradict many prior studies (Dragoni et al., 2011, 2014; Nagahi et al., 2019; Nagalakshmi et al., 2025; Ma et al., 2019) but also challenge conventional ideas about managers' mental development over the years and therefore warrant attention in future academic endeavors.

The findings regarding the industry specifics resulted in identifying that in education and research, leaders possessed the most prominent normative competence compared to other sectors. This result underlines the importance of higher education institutions and research bodies in cultivating sustainable leadership values among their fellows and their flagship role in raising the general public's awareness about sustainability challenges (Brundiers et al., 2021; Galleli et al., 2020). The hypothesized positive link between manufacturing, construction, and extraction was not supported, which signals that despite the critical significance of sustainable leadership competencies in this sector, their managers do not distinguish themselves from other leaders by these skills that might be engendered by external public high pressure on them, but not their internal commitment to this agenda (Li & Maqsood, 2025). Human resource managers, particularly in diversified companies, should consider industry specificity while elaborating on HR development programs and corporate strategies.

We also discovered that women build and sustain better relationships with their companies' stakeholders than their male colleagues, which complies with the preceding studies (Angelakis et al., 2023; Kachniewska & Para, 2023). However, another subconstruct of the normative competence, building engagement, is not linked to gender: men and women are equally skilled at creating an atmosphere of engagement and trust in their organizations. These results contradict the studies about gender specificity (Larsson et al., 2023; Pfaff et al., 2013) but support the idea that stereotypes may engender this difference (Lipovka et al., 2021) since gender is often less significant compared to other proxies in complex research of personal, organizational, and industry factors.

http://dx.doi.org/10.21511/ppm.23(4).2025.34

CONCLUSION

The study aimed to investigate the influence of personal, organizational, and industry variables on sustainable leadership competencies of managers from Hungary, Kazakhstan, and Türkiye, along with the moderating effect of the countries on these relationships. Taken together, the results demonstrated that the influence of individual characteristics on the competencies of sustainable leadership could not be properly assessed without considering the country context, and the effects of moderation were selectively manifested for different types of competencies. The cross-country differences in the united sample were mostly produced by Kazakhstani participants, less by Hungarian, and the least by Turkish. The analysis stands for understanding sustainable leadership as a system of diverse and non-homogeneous competencies that substantially vary between managers, industries, and countries.

The implications for the theory of the present study are two-fold. First, this study's findings extend the existing knowledge on how personal and organizational factors impact managers' sustainable leadership competencies. Second, the research expands the application of the Sustainability Leadership Concept by Wiek et al. (2011) with the cross-cultural perspective of Turkic nations, representing emerging economies of Central Europe and Central Asia.

The present study examines a limited number of social-demographic and organizational factors; thus, including managers' education, family status, and managerial level could yield new insights into the topic. The simulation mode, despite its comprehensive character, might result in some possible deflation of results based on younger generations' better orientation in virtual reality, including faster reactions and decision-making. Thus, a combination of simulation business games with other types of assessments in future studies could be beneficial. Thirdly, since the individual reliability indicators were at the lower limit or slightly below the standard thresholds, it is advised to boost their number to raise α and CR in future studies.

The obtained results on gender, age, and industry should be used by line managers and human resource professionals to recruit and select managers whose activities are directly related to sustainable leadership roles. In particular, women should be considered for positions in charge of stakeholder management, whereas younger managers under 30 should be engaged in foresight sessions and strategic planning teams within organizations. Public bodies can use this knowledge to assess their managers for sustainable leadership to verify whether the declared sustainability agenda is internally shared by their staff. Universities should step forward by disseminating and commercializing their knowledge on sustainable leadership competencies among other industries' management.

AUTHOR CONTRIBUTIONS

Conceptualization: Anastassiya Lipovka, Zoltan Buzady.
Data curation: Zoltan Buzady, Kuanysh Abeshev.
Formal analysis: Anastassiya Lipovka, Kuanysh Abeshev.
Funding acquisition: Anastassiya Lipovka.
Investigation: Zoltan Buzady.
Methodology: Anastassiya Lipovka, Zoltan Buzady.
Project administration: Anastassiya Lipovka.
Resources: Anastassiya Lipovka, Zoltan Buzady, Kuanysh Abeshev.
Software: Kuanysh Abeshev.
Supervision: Zoltan Buzady.
Validation: Kuanysh Abeshev.
Visualization: Kuanysh Abeshev.
Writing – original draft: Anastassiya Lipovka.
Writing – review & editing: Anastassiya Lipovka, Zoltan Buzady, Kuanysh Abeshev.

ACKNOWLEDGMENT

This research has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. AP22687001) within the project titled "Designing a Conceptual Model of Managers' Leadership Competencies in Kazakhstan through the Gender Potential Prism".

REFERENCES

1. Alonso-Almeida, M., Perramon, J., & Bagur-Femenias, L. (2017). Leadership styles and corporate social responsibility management: Analysis from a gender perspective. *Business Ethics, the Environment, and Responsibility, 26*(2), 147-161. https://doi.org/10.1111/beer.12139
2. Alvarez-García, J., Hormiga-Pérez, E., Sarango-Lalangui, P. O., & del Río-Rama, M. D. L. C. (2022). Leaders' sustainability competences and small and medium-sized enterprises outcomes: The role of social entrepreneurial orientation. *Sustainable Development, 30*(5), 927-943. https://doi.org/10.1002/sd.2291
3. Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423. https://doi.org/10.1037/0033-2909.103.3.411
4. Angelakis, A., Inwinkl, P., Berndt, A., Ozturkcan, S., Zelenajova, A., & Rozkopal, V. (2023). Gender differences in leaders' crisis communication: A sentiment-based analysis of German higher education leaderships' online posts. *Studies in Higher Education, 49*(4), 609-622. https://doi.org/10.1080/03075079.2023.2246505
5. Archer, T., Jansson, B., & Olsen, K. (2025). Effect of age upon leadership attributes from recruitment instrument: A selective developmental trajectory. *Clinical and Experimental Psychology*, 1(1), Article 1000106. Retrieved from https://french.iomcworld.org/abstract/effect-of-age-upon-leadership-attributes-from-recruitment-instrument-a-selective-developmental-trajectory-46393.html
6. Avery, G. (2005). *Leadership for sustainable futures: Achieving success in a competitive world.* Edward Elgar Publishing. https://doi.org/10.4337/9781845425494
7. Bencsik, A., & Belas, Y. (2024). Characteristics of sustainable leadership in international comparison. *Economics and Sociology Journal, 17*(4), 272-294. https://doi.org/10.14254/2071-789X.2024/17-4/15
8. Bencsik, A., & Berke, Sz. (2023). Sustainable leadership in practice in Hungary. *Proceedings of the 19th European Conference on Management Leadership and Governance, UK, 19*(1), 9-19. https://doi.org/10.34190/ecmlg.19.1.1544
9. Bencsik, A., & Pangsy-Kania, S. (2023). Sustainable leadership practices based on the logic of the honeybee pyramid – Comparison of Hungarian and Polish SMEs. *Sustainability*, *15*(17), Article 13103. https://doi.org/10.3390/su151713103
10. Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., Dripps, W., Habron, G., Harré, N., Jarchow, M., Losch, K., Michel, J., Mochizuki, Y., Rieckmann, M., Parnell, R., Walker, P., & Zint, M. (2021). Key competencies in sustainability in higher education – Toward an agreed-upon reference framework. *Sustainability Science, 16,* 13-29. https://doi.org/10.1007/s11625-020-00838-2
11. Buzady, Z., & Lipovka, A. (2024). Kazakhstan: Going global in a post-Soviet country. In B. Gehrke, M.-T. Claes, I. Aust-Gronarz, D. Pauknerova, & R. Bell. (Eds.), *Global leadership practices. Competencies for managing in a complex world* (pp. 193-209). Edward Elgar Publishing. https://doi.org/10.4337/9781035308088.00021
12. Çuhadar, S., & Rudnak, I. (2022). Importance of sustainable leadership and sustainable leadership practices among middle-level Hungarian managers. *Journal of Management/Vadyba, 38*(2), 101-111. https://doi.org/10.38104/vadyba.2022.2.10
13. Dentoni, D., Blok, V., Lans, T., & Wesselink, R. (2012). Developing human capital for agri-food firms' multi-stakeholder interactions. *International Food and Agribusiness Management Review, 15* (Special Issue A), 61-68. https://doi.org/10.22004/ag.econ.129178
14. Diaz-Fernandez, M., Lopez-Cabrales, A., & Valle-Cabrera, R. (2024). Sustainable strategies, employee competencies and social outcomes: Are they aligned? *International Journal of Manpower, 45*(7), 1426-1449. https://doi.org/10.1108/IJM-02-2023-0066
15. Dragoni, L., Oh, I., Tesluk, P.E., Moore, O.A., VanKatwyk, P., & Hazucha, J. (2014). Developing leaders' strategic thinking through global work experience: The moderating role of cultural distance. *Journal of Applied Psychology, 99*(5), 867-882. https://doi.org/10.1037/a0036628
16. Dragoni, L., Oh, I., Vankatwyk, P., & Tesluk, P. E. (2011). Developing executive leaders: The relative contribution of cognitive ability, personality, and the accumulation of work experience in predicting strategic thinking competency. *Personnel Psychology, 64*(4), 829-864. https://doi.org/10.1111/j.1744-6570.2011.01229.x
17. Eberz, S., Lang, S., Breitenmoser, P., & Niebert, K. (2023). Taking the lead into sustainability: Decision makers' competencies for a greener future. *Sustainability, 15*(6), Article 4986. https://doi.org/10.3390/su15064986

http://dx.doi.org/10.21511/ppm.23(4).2025.34

18. Fauzi, Basrowi, Wulandari, & Irviani, R. (2025). Fostering sustainability through leadership and employee personality traits. *Sustainable Futures, 9,* Article 100502. https://doi.org/10.1016/j.sftr.2025.100502

19. Fligby. (2024). *Gameplay data research*. ALEAS Group. Retrieved from https://www.fligby.com/academia/gameplay-data-research/

20. Galleli, B., Hourneaux, F. Jr, & Munck, L. (2020). Sustainability and human competences: A systematic literature review. *Benchmarking: An International Journal, 27*(7), 1981-2004. https://doi.org/10.1108/BIJ-12-2018-0433

21. Glińska-Neweś, A., Escher, I., Józefowicz, B., & Łuka, A. (2020). Managing strategic paradoxes: The influence of demographic characteristics of decision-makers. *Journal of Organizational Change Management, 33*(5), 835-858. https://doi.org/10.1108/JOCM-07-2019-0243

22. Griffin, D., Guedhami, O., Li, K., & Lu, G. (2021). National culture and the value implications of corporate environmental and social performance. *Journal of Corporate Finance, 71,* Article 102123. https://doi.org/10.1016/j.jcorpfin.2021.102123

23. Grigorescu, A., Munteanu, I., Dumitrica, C.-D., & Lincaru, C. (2023). Development of a green competency matrix based on civil servants' perception of sustainable development expertise. *Sustainability, 15*(18), Article 13913. https://doi.org/10.3390/su151813913

24. Hahn, R., Pioch, T., Reimsbach, D., & Schiemann, F. (2025). What drives carbon-reducing investments? A vignette experiment on managers' decision-making from a multilevel perspective. *Business Strategy and the Environment, 34*(3), 3008-3026. https://doi.org/10.1002/bse.4134

25. Hallinger, P., & Suriyankietkaew, S. (2018). Science mapping of the knowledge base on sustainable leadership, 1990–2018. *Sustainability, 10*(12), Article 4846. https://doi.org/10.3390/su10124846

26. Hargreaves, A., & Fink, D. (2004). The seven principles of sustainable leadership. *Educational Leadership, 61*(7), 8-13. Retrieved from https://www.researchgate.net/publication/292228904_The_Seven_Principles_of_Sustainable_Leadership

27. Hopkins, M. M., & Bilimoria, D. (2008). Social and emotional competencies predicting success for male and women executives. *Journal of Management Development, 27*(1), 13-35. https://doi.org/10.1108/02621710810840749

28. Jordan, S. W., Servi, J. P., & Manderscheid, S. V. (2025). Gender insights on team-oriented leadership: Findings from the Globe Project. *International Journal of Business and Applied Social Science, 11*(1), 1-15. https://doi.org/10.33642/ijbass.v11n1p1

29. Kachniewska, M., & Para, A. (2023). Feminine vs. masculine: Expectations of leadership styles in hotels during the COVID-19 pandemic. *Sustainability, 15*(13), Article 10602. https://doi.org/10.3390/su151310602

30. Knight, B., & Paterson, F. (2018). Behavioural competencies of sustainability leaders: An empirical investigation. *Journal of Organizational Change Management, 31*(3), 557-580. https://doi.org/10.1108/JOCM-02-2017-0035

31. Larsson, G., Molnar, M.M., Tinnerholm Ljungberg, H., & Björklund, C. (2023). Leadership through the subordinates' eye: Perceptions of leader behaviors in relation to age and gender. *Leadership & Organization Development Journal, 44*(1), 18-33. https://doi.org/10.1108/LODJ-07-2021-0333

32. Li, D., & Maqsood, U. S. (2025). CEO's demographic, governance, and career factors in environmental and sustainable performance: Evidence from China M&A cases. *Business Ethics, the Environment and Responsibility*. https://doi.org/10.1111/beer.12814

33. Liao, Y. (2022). Sustainable leadership: A literature review and prospects for future research. *Frontiers in Psychology, 13,* Article 1045570. https://doi.org/10.3389/fpsyg.2022.1045570

34. Lipovka, A., Korolyova, N., Nugmanova, M., & Salimzhanova, A. (2021). Comparative influence of gender, age, industry and management level on communication. *Problems and Perspectives in Management, 19*(2), 170-182. https://doi.org/10.21511/ppm.19(2).2021.14

35. Liu, L. (2019). Top management characteristics, green supply chain management and corporate performance – Moderating effects of competition intensity. *Journal of Human Resource and Sustainability Studies, 7*(1), 55-71. https://doi.org/10.4236/jhrss.2019.71005

36. Ma, Y., Zhang, Q., Yin, Q., & Wang, B. (2019). The influence of top managers on environmental information disclosure: The moderating effect of company's environmental performance. *International Journal of Environmental Research and Public Health, 16*(7), Article 1167. https://doi.org/10.3390/ijerph16071167

37. Mahmood, M., Uddin, M.A., Ostrovskiy, A., & Orazalin, N. (2020). Effectiveness of business leadership in the Eurasian context: Empirical evidence from Kazakhstan. *Journal of Management Development, 39*(6), 793-809. https://doi.org/10.1108/JMD-05-2019-0154

38. Nagahi, M., Hossain, N., Amrani, S., Jaradat, R., Khademibami, L., Goerger, S., & Buchanan, R. (2022). Investigating the influence of demographics and personality types on practitioners' level of systems thinking skills. *IEEE Transactions on Engineering Management, 69*(6), 3923-3937. https://doi.org/10.1109/TEM.2021.3075414

39. Nagahi, M., Hossain, N., Jaradat, R.M., & Grogan, S. (2019). Moderation effect of managerial experience on the level of systems-thinking skills. *2019 IEEE International Systems Conference (SysCon)*, 1-5. https://doi.org/10.1109/SYSCON.2019.8836941

40. Nagalakshmi, M.V.N, Sai Sri Charan, Y.V.N., Panchaaariya, R.O., Padma, S., & Awasthi, S. (2025). Sustainable business practices and leadership as catalyst for employee innovation in IT industry. *Journal of Information*

Systems Engineering and Management, 10(23s), 911-919. https://doi.org/10.52783/jisem.v10i23s.3814

41. Navia, J.M.A., Plazas, E.R., & Diaz, Y.C. (2019). Leadership and social responsibility from the perspective of gender. *Problems and Perspectives in Management, 17*(2), 303-312. http://dx.doi.org/10.21511/ppm.17(2).2019.23

42. Organization of Turkic States. (n.d.). *History of the organization*. Retrieved from https://turkicstates.org/en/history-of-organization

43. Ozen, A., & Ayla, E. (2024). Sustainable leadership competencies at the top: An agenda for the future. *Journal of Electrical Systems, 20*(4s), 1595-1601. Retrieved from https://www.researchgate.net/publication/380046354_Sustainable_Leadership_Competencies_at_the_Top_An_Agenda_for_the_Future

44. Padhi, D., Chavan, P. S., & Mitra, R. (2018). Understanding systems thinking from the perspectives of experience and diversity. *2018 IEEE Tenth International Conference on Technology for Education (T4E)*, 122-125. https://doi.org/10.1109/T4E.2018.00033

45. Pfaff, L. A., Boatwright, K. J., Potthoff, A. L., Finan, C., Ulrey, L. A., & Huber, D. M. (2013). Perceptions of women and men leaders following 360-degree feedback evaluations. *Performance Improvement Quarterly, 26*(1), 35-56. https://doi.org/10.1002/piq.21134

46. Remišová, A., & Lašáková, A. (2015). Ethical leadership styles of future managers in Central and Eastern European countries. In I. Management Association (Ed.), *Human Rights and Ethics: Concepts, Methodologies, Tools, and Applications* (pp. 892-911). IGI Global Scientific Publishing. Retrieved from https://ideas.repec.org/a/igg/jabe00/v2y2013i1p30-50.html

47. Streufert, S., Pogash, R., Piasecki, M., & Post, G. M. (1990). Age and management team performance. *Psychology and Aging, 5*(4), 551-559. https://doi.org/10.1037/0882-7974.5.4.551

48. Suriyankietkaew, S., Krittayaruangroj, K., & Iamsawan, N. (2022). Sustainable leadership practices and competencies of SMEs for sustainability and resilience: A community-based social enterprise study. *Sustainability, 14*(10), Article 5762. https://doi.org/10.3390/su14105762

49. Tavitiyaman, P., Weerakit, N., & Ryan, B. (2014). Leadership competencies for hotel general managers: The differences in age, education, and hotel characteristics. *International Journal of Hospitality & Tourism Administration, 15*(2), 191-216. https://doi.org/10.1080/15256480.2014.901069

50. Tezcan, Ö., & Kuleyin, B. (2021). Evaluating port operation managers' competencies related to the port environmental sustainability performance. *Pomorstvo, 35*(1), 141-149. https://doi.org/10.31217/p.35.1.15

51. Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science, 6,* 203-218. https://doi.org/10.1007/s11625-011-0132-6

52. Wimmer, A., Buzady, Z., Csesznak, A., & Szentesi, P. (2022). Intuitive and analytical decision-making skills analysed through a flow developing serious game. *Journal of Decision Systems, 31*(sup1), 4-17. https://doi.org/10.1080/12460125.2022.2073863

53. Yangil, F. M., & Şahin, M. D. (2019). Sürdürülebilir liderlik ölçeği: Geçerlik ve güvenirlik analizi [The sustainable leadership scale: Validity and reliability analysis]. *Business and Management Studies: An International Journal, 7*(5), 2124-2147. (In Turkish). https://doi.org/10.15295/bmij.v7i5.1276

http://dx.doi.org/10.21511/ppm.23(4).2025.34

APPENDIX A

Table A1. Descriptive statistics

Indicator	Count	Mean	Min	25%	50%	75%	Max	StD
Analytical skill	1,756	63.33	18.00	56.00	63.00	73.00	100.00	11.93
Building engagement	1,756	65.70	9.00	59.00	66.00	72.00	94.00	9.44
Conflict management	1,756	61.85	22.00	57.00	63.00	67.00	88.00	9.33
Empowerment	1,756	60.76	–	50.00	62.00	73.00	100.00	15.41
Future orientation	1,756	67.24	10.00	60.00	68.00	74.00	100.00	10.90
Social dynamics	1,756	65.12	15.00	58.00	65.00	71.00	93.00	9.78
Stakeholder management	1,756	65.82	–	55.00	67.00	80.00	100.00	15.64
Strategic thinking	1,756	62.70	11.00	56.00	63.00	71.00	100.00	11.45
Teamwork management	1,756	60.38	18.00	55.00	60.00	67.00	91.00	9.99
Women	1,756	0.48	–	–	–	1.00	1.00	0.50
Hungary	1,756	0.40	–	–	–	1.00	1.00	0.49
Kazakhstan	1,756	0.37	–	–	–	1.00	1.00	0.48
Türkiye	1,756	0.24	–	–	–	1.00	1.00	0.42
Age	1,756	36.76	18.00	29.00	36.00	44.00	75.00	10.02

APPENDIX B

Table B1. Correlation matrix between clusters

	Systems thinking	Anticipatory	Normative	Strategic	Interpersonal
Systems thinking	1	0.547	0.738	0.743	0.610
Anticipatory	0.547	1	0.532	0.541	0.738
Normative	0.738	0.532	1	0.696	0.542
Strategic	0.743	0.541	0.696	1	0.560
Interpersonal	0.610	0.739	0.542	0.560	1