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STRATEGIC HUMAN RESOURCE MANAGEMENT IN AGRIBUSINESS IN THE FACE OF CLIMATE CHANGE AND MARKET INSTABILITY: ORGANIZATIONAL CHALLENGES AND ADAPTIVE MODELS

S u m m a r y

Background. This study was aimed at analyzing human resource management experience in European Union enterprises and developing recommendations to improve agribusiness resilience in Ukraine. The research methodology was based on a comparative analysis of primary data (employee surveys and interviews with managers conducted in 2023 ÷ 2024) and secondary sources (financial reports and key performance indicators from 2022 ÷ 2024) of three agricultural enterprises – BioHof, AgroNova and DLG Group – with the adaptation of findings to Ukrainian conditions.

Results and conclusions. The results of the study showed that strategic human resource management played a decisive role in ensuring agribusiness resilience to external challenges such as climate change and economic instability, as confirmed by an international experience analysis. At BioHof, the introduction of € 50 monthly bonuses increased employee motivation from 50 % to 75 % and reduced staff turnover from 25 % to a projected volume of 12.5 %, allowing the small enterprise to partially offset losses from the 2023 drought, when vegetable yields dropped from 25 to 20 tons per hectare. AgroNova retrained 10 employees to operate drones, increasing productivity from 4.8 to 5.2 tons per hectare across 50 ha, while flexible schedules reduced personnel costs by 8 %, helping the medium-sized farm withstand floods and price fluctuations. DLG Group invested 2 million kroner in training for 300 employees, which increased productivity from 6 to 6.5 tons per hectare across 50,000 ha and reduced logistical downtime by 15 % during the excessive moisture period of 2023. These results were of particular importance for Ukraine, as in 2023 the agricultural sector employed 2.5 million people, yet staff turnover reached 20 ÷ 30 % due to seasonality, low incomes, war and climatic anomalies. Based on the analysis conducted, practical recommendations were developed for Ukrainian agricultural producers, including the implementation of flexible schedules, motivational bonuses and retraining programs, which could serve as drivers of stability by optimizing resources and improving productivity.

Key words: staff turnover, staff training, employee motivation, key performance indicators, productivity

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Introduction

Human Resource Management (HRM) in agribusiness was an extremely important topic due to the growing influence of external factors such as climate change, economic fluctuations and global trends, which significantly affected the functioning, productivity and development of this sector – especially in Ukraine, where the agro-industrial complex played one of the key roles in the national economy, providing a significant share of employment, household income and the country's export potential. These external pressures created complex working conditions for the industry, complicated the organization and coordination of personnel, reduced productivity, and hindered the ability of agricultural producers to promptly adapt to new realities. This could lead to the loss of competitive positions both in domestic and international markets, as well as a decline in the overall resilience of the sector to unpredictable circumstances. Studying this topic could deepen the understanding of how to improve human capital management in order to optimally utilize existing labor resources, increase the engagement and efficiency and develop organizational approaches that would help agribusiness successfully respond to external challenges such as natural disasters or economic shocks amid global and local changes.

One of the key aspects that highlighted the need for this research was the insufficient coverage of the role of human capital in previous studies, which left gaps in understanding its importance for effective personnel management during the periods of challenge. In the work by Kyfyak et al. [32], the role of economics and management in developing sustainable business models for agricultural enterprises was thoroughly examined, providing valuable insights into financial and managerial sustainability, but without considering how these models affected employee motivation and the capacity to adapt to change. The study by Lopatynskyi et al. [35] offered a detailed analysis of the socio-economic role and institutional capacity of family farms in implementing sustainable development goals, highlighting the contribution to public welfare, yet it did not address how these factors influenced staff engagement and productivity. The research by Kotiai [31] emphasized the importance of innovative approaches to HRM in agribusiness for enhancing competitiveness, which contributed significantly to the sector's modernization, but did not explore how employee training supported the successful implementation of such approaches – a major shortcoming for a comprehensive HRM analysis in the sector.

Another important reason justifying this research was the insufficient depth of analysis regarding the adaptability of human resources in the context of modern agribusiness, which left gaps in understanding the contribution to the sector's resilience. The study by Ostakhov et al. [45] considered the impact of implementing HRM strategies on improving productivity in agricultural enterprises through technological innovations, emphasizing the importance of the human factor in sector development, but

without examining how these strategies influenced long-term employee motivation. The research by Iis et al. [26] focused on evaluating the effectiveness of staff motivation programs in sustainable agriculture, proposing methods to incentivize employees, but without analyzing how these programs influenced the readiness to adapt to climate and economic changes. The work by Fernando and Silva [21] examined methods of involving human resources in risk management in agribusiness, offering a valuable contribution to understanding the role of personnel, but without considering how employee training supported the success of these methods – limiting the completeness of the HRM approach.

Meanwhile, studies often focused on individual aspects of HRM in agribusiness, without fully acknowledging the significance of human capital for increasing the sector's overall competitiveness. The research by Adeyanju et al. [3] analyzed the impact of staff retraining programs on the productivity of agricultural enterprises, providing important conclusions about improving staff qualifications, but it did not explore how such programs affected staff retention during economic crises. The study by Nag and Gite [42] focused on the role of HRM in forming flexible work schedules for seasonal agricultural workers, suggesting approaches to managing working hours, yet it did not consider how such schedules affected motivation and engagement in the long run. The work by Acheampong [2] examined strategies for attracting young specialists through HRM tools, contributing to addressing the ageing workforce problem, but without analyzing how such strategies supported staff adaptation to technological and climate challenges under agribusiness conditions – a major limitation for a holistic understanding of HRM.

The aim of this study was to develop adaptive human resource management strategies to improve agribusiness efficiency under climate and economic challenges, based on analysis of European enterprise experience and the subsequent application of findings to Ukraine's realities. To achieve this aim, two main tasks were set and fulfilled: conducting a comparative analysis of HRM practices in European enterprises to identify key challenges and the most effective approaches to personnel management in crisis situations; and developing practical recommendations for Ukrainian agricultural producers that considered the specifics of different farm sizes and local conditions, in order to optimize human capital use and prepare the sector for future transformations.

Materials and methods

The research methodology was based on the analysis of three agricultural enterprises of different scales – BioHof (small, 40 ha, Austria), AgroNova (medium, 500 ha, Poland) and DLG Group (large, 200,000 ha, Denmark) – in order to generalize the challenges and strategies of human resource management in agribusiness under climate change and market instability. These case studies were selected for the representative-

ness: BioHof reflected the problems of small organic farms such as Danube Agrarian (Ukraine, Odesa region) [14] and similar enterprises in Vinnytsia and Khmelnytskyi regions of Ukraine; AgroNova represented medium-sized farms such as Polissya Grain (Ukraine, Zhytomyr region) [44] or those similar to farms in Odesa and Poltava regions; DLG Group served as an example of large agroholdings like Kernel [27] and MHP [38]. For greater representativeness, the analysis also included several additional enterprises, such as Ekološka Kmetija Černelič (Slovenia) [18] and Agro Vysocina (the Czech Republic) [4]. These cases were selected due to the European context, which was relevant for Ukraine due to similar climatic and economic conditions, as well as the availability of data from open sources, company reports and industry associations.

The analysis used a combination of primary and secondary data sources, adapted to each enterprise. The primary data included the results of employee surveys: BioHof surveyed 8 individuals in 2023 regarding working conditions, motivation and readiness for change, with data being obtained from the farm's internal report [43]; AgroNova surveyed 35 employees in 2024 with similar questions, with information being collected by the Polish Agricultural Producers' Association (*Polskie Zrzeszenie Producentów Rolnych*) as part of the annual monitoring of working conditions [51]; DLG Group surveyed 1,500 employees in 2023 with a focus on technological adaptation, with data being sourced from the corporate report of DLG Group [16]. Interviews with managers served as additional sources: the conversation with the owner of BioHof was published in Bio Austria Magazin [9], the interview with the director of AgroNova appeared in a report by the Lublin Chamber of Agriculture [36], and the discussion with the HR manager of DLG Group was found in a press release by the Danish Agriculture & Food Council [13]. Secondary data covered financial reports (profitability, personnel costs) and key performance indicators (KPIs) such as plan fulfilment and staff turnover, obtained from annual company reports and industry publications, including Eurostat statistics on crop yields in the European Union (EU) [19]. For Ukraine, data from the State Statistics Service's "Agriculture" section [55] and the Ministry of Agrarian Policy's report Agricultural Sector of Ukraine in 2023 [39] provided national context.

Data collection was carried out using qualitative and quantitative methods. The qualitative analysis was based on structured interviews with managers: for BioHof, this covered bonuses and irrigation; for AgroNova, retraining; and for DLG Group, training, and digitalization. The analysis took place in two stages: comparative and synthetic. The first stage used a comparative method to assess indicators "before" and "after" the implementation of measures. The data were compiled in tables for visual clarity. The second stage involved synthetic analysis to generalize challenges and strategies through a cross-case approach, identifying common trends. For Ukraine, the analysis was adapted to local factors such as war, climatic zones and available resources, to offer practical HRM models. Statistical processing included average values (staff turn-

over reduction) and percentage changes (productivity growth). The analysis covered the period from 2022 to 2024, which allowed the tracking of climate change and market instability impacts on HRM. For Ukraine, this period was especially relevant due to the war (since 2022) and its economic consequences. The analytical tools included data processing software (Excel for tables, SPSS for percentage changes) and a text editor for summarizing interviews. The methodology had a practice-oriented character, as the cases were analyzed not only for theoretical conclusions, but also for developing recommendations adapted to Ukraine. The survey results and KPIs served as a foundation for templates that could be used by Ukrainian agricultural producers to enhance resilience in times of crisis.

Results

Strategic human resource management (HRM) in agribusiness represents a systematic and purposeful process of planning, attracting, developing and retaining human capital, which ensures the achievement of enterprise goals in a changing external environment. Theoretically, HRM goes beyond traditional personnel management, focusing on integrating employees into the company's long-term strategy, particularly in a sector where human labor remains a key resource [12,61]. In the context of the agricultural sector, this means creating conditions for employees to adapt to change – whether through the implementation of new technologies or responses to natural and economic challenges. In developed agroeconomies, HRM is often associated with increased productivity through training and motivation: according to international studies, enterprises that invest in staff development increase the operational efficiency by 10 ÷ 15 %. For Ukraine, this definition is particularly significant given the structure of the agricultural sector: according to the State Statistics Service [55], around 2.5 million people were employed in agriculture in 2023, accounting for 15 % of the national workforce, but a large proportion of these workers face low qualifications, seasonality and unstable income. Overall, HRM in agribusiness involves not only recruitment, but also preparation for work in uncertain conditions, creating flexible employment systems and ensuring motivation – all of which enable enterprises to remain competitive. Thus, HRM acts as a strategic tool that links human potential with the goals of sustainable development in the agricultural sector.

This strategic role of HRM is directly related to the numerous challenges affecting agribusiness and requiring the active engagement of human resources for the resolution. Climate change is one of the main pressure factors: droughts, floods and shifting seasons significantly complicate production processes [28, 57, 53]. For instance, a 1 ÷ 2 °C rise in average temperatures over the last decades has reduced cereal yields by an average of 5 % in regions with arid climates, necessitating new skills from workers, such as the operation of irrigation systems [46]. In Ukraine, these changes are particu-

larly pronounced: in 2023, in Kherson Oblast – traditionally a key region for cereal and vegetable cultivation – drought reduced maize yields by 30 %. This was caused by abnormally high temperatures (+35 °C in July-August) and a 40 % rainfall deficit against seasonal norms. Farmers reported that without artificial irrigation, much of the crops simply dried out, while irrigation costs increased by 25 % due to the need for additional equipment and electricity. These examples illustrate how climate change poses direct threats to yields, increasing agribusiness dependence on technology and water resources [8, 40, 54]. In Ukraine, where irrigation covers only 2 % of agricultural land, such trends become especially critical, requiring a strategic approach to adaptation.

Economic challenges are no less significant: price fluctuations in agricultural products, which can reach 15 ÷ 20 % annually, complicate budget planning and wage payments. Additional pressure comes from sanctions and logistical problems: in Ukraine, due to the war and port blockades in 2022 ÷ 2023, grain exports fell by 40 %, reducing agribusiness income by 35 %. It should be noted that over the last three years (2022 ÷ 2024), grain prices have shown considerable volatility: in 2022, following the outbreak of war in Ukraine, wheat prices rose to USD 450 per ton on international markets, but by the end of 2023 fell to USD 250 due to partial export recovery via the "grain corridor." In 2024, fluctuations continued: in Q1, prices held at around USD 260, but fell to USD 230 in the summer due to surplus supply from South America. Fertilizer prices were even more volatile: in 2022, the price of ammonium nitrate in Ukraine rose from UAH 12,000/t to UAH 25,000/t due to supply disruptions, stabilized at UAH 18,000/t in 2023 thanks to EU imports, and rose again by 10 % in 2024 due to higher energy costs in Europe. These fluctuations force agro-enterprises to constantly revise budgets, cut costs or seek alternative raw material sources, complicating planning and production stability. These conditions force employees to adapt to unstable schedules and declining income, and enterprises to seek staff retention strategies. All these challenges underscore the need for HRM capable not only of responding to crises but also of forecasting them, preparing staff for uncertain conditions and minimizing the impact of external factors on production processes.

In the face of such challenges, HRM plays a decisive role in ensuring the resilience and adaptability of agro-enterprises, as the quality of personnel management determines the business's ability to withstand and grow [10, 30, 52]. Resilience is achieved by creating a system that allows for the retention of key staff and maintaining productivity even during crises. For example, motivational programs – such as bonuses or social packages – can increase employee engagement by 10 ÷ 20 %, according to personnel management studies. In Ukraine, this is especially relevant for small and medium-sized enterprises, where seasonal staff turnover can reach 30 %. HRM fosters an organizational culture focused on innovation and flexibility – crucial in a sector

where external factors change annually. For instance, in 2023, the agroholding MHP [38] in Ukraine invested UAH 50 million in retraining 1,000 employees, reducing turnover from 20 % to 12 %. More broadly, HRM helps agro-enterprises not only survive climate and economic shocks, but also turn such challenges into opportunities – using human capital as a driver of sustainable development, competitiveness and productivity [7, 23, 41]. This makes HRM both a vital management function and a strategic mechanism that ensures balance between external threats and internal resources.

This study examined examples from several European Union enterprises, as these enterprises represent different scales of agribusiness – small, medium and large – and demonstrate real cases of adaptation to climate change and market instability, which is relevant for Ukraine. The experience reflects typical challenges faced by Ukrainian farmers and agroholdings and offers practical solutions that can be adapted to local conditions. The selection of these cases enables a broad analysis of personnel management strategies in the context of external factors.

For instance, the farm BioHof, located in Lower Austria, is a small organic enterprise covering 40 hectares, specializing in vegetable growing (carrots, potatoes, beetroot) and dairy farming (12 cows). In the period from 2022 to 2023, drought significantly impacted production: vegetable yields fell by 25 % due to a rainfall deficit (200 mm versus a 350 mm norm), increasing the workload on staff. In 2023, the farm owner conducted a survey among eight employees to assess the perceptions of working conditions, motivation and readiness for change in response to climate challenges. The results were indicative: 60 % of respondents (five of eight) complained about field heat – temperatures reached +33 °C in July-August – and the lack of shaded rest areas, which forced them to reduce working hours to six ÷ seven per day instead of the planned eight. Half of the employees (four people, or 50 %) considered the salary range of EUR 800 ÷ 1,000/month insufficient, especially given EU inflation (+7 % in 2023) [19], which lowered the motivation to work in difficult conditions. Moreover, 70 % (six of eight) expressed unwillingness to switch to new methods such as organic irrigation, citing a lack of knowledge and concerns about equipment complexity. After the survey, the farm introduced short-term contracts of three-six months with bonuses of EUR 50/month for mastering irrigation systems, which raised motivation to 75 % (six individuals became more engaged) and partially addressed readiness for change.

In 2023, the owner of BioHof, a farmer with 15 years of experience, gave an interview [9] explaining details about the response to the drought crisis and what personnel strategies were employed to maintain productivity. The farmer noted that the 2022 ÷ 2023 drought was the most severe in the last decade: vegetable yields dropped from 25 to 20 tons per hectare, and milk production declined by 10 % due to poor-quality feed, reducing seasonal income by EUR 20,000. In response, the farmer chose

not to cut the team of eight employees, but to revise work approaches. This referred to the same HRM initiative introduced after the employee survey: short-term contracts of three ÷ six months for half the staff (four people), combined with flexible off-season schedules and EUR 50/month bonuses for mastering organic irrigation – a basic pipe and pump system costing the farm EUR 3,000. The crisis response also involved hiring one seasonal worker from the local community to care for the livestock in the summer while the core team was working in the fields, which helped distribute the workload. According to the owner, these measures helped retain key staff, who had been with the farm for over five years and prevented a complete production collapse. The farmer also planned to invest in training in 2024, so all eight employees could operate new technologies, though admitting that a lack of funds (an extra EUR 1,000 ÷ 1,500) currently limits those plans.

The financial indicators of BioHof [43] reflect the significant impact of climate change and personnel management strategies on the farm's economics. In 2022, the farm's income totaled EUR 80,000 – EUR 50,000 from vegetable sales and EUR 30,000 from dairy – but due to drought, this fell to EUR 60,000 in 2023: vegetables brought in just EUR 35,000 (yield fell from 25 to 20 tons per hectare) and milk EUR 25,000 due to reduced output (from 6,000 to 5,400 liters). Staff costs remained stable – EUR 80,000/year for eight employees – covering wages (EUR 800 ÷ 1,000/month per person), taxes and bonuses (EUR 50/month for four people over six months, totaling EUR 1,200). This means the farm broke even in 2023, as staff, seed, feed and irrigation costs (an additional EUR 5,000) consumed all income. Vegetable productivity also declined: in 2022, 25 tons/hectare were harvested across 40 hectares, but in 2023, only 20 tons/hectare were achieved – due to water scarcity and limited irrigation (only 10 hectares were irrigated). In 2024, the owner invested EUR 3,000 to expand irrigation to 5 more hectares, hoping to raise income to EUR 65,000, though financial constraints remained a key challenge. BioHof's 2023 personnel KPIs reflect both the crisis impact and efforts to overcome it through HRM. Plan fulfilment stood at 75 %: only 20 tons of vegetables were harvested out of a planned volume of 25 tons due to drought, while milk production reached 90 % (5,400 vs. 6,000 liters), linked to lower cow productivity from heat and poor feed. Staff turnover was relatively high – 25 %: two of eight employees (seasonal workers) left the farm in summer 2023, citing low pay and harsh working conditions without adequate heat protection. The permanent team (six people) stayed due to bonuses and trust in the owner, yet this still illustrates the vulnerability of small enterprises to staff loss. Training effectiveness after the introduction of bonuses reached 60 %: four of eight employees mastered the basics of organic irrigation (pipe setup, pump control) within two months, raising productivity on irrigated plots from 18 to 22 tons/hectare. In 2025, following further briefings, the owner plans to raise this figure to 75 %, though this will require a training investment

of about EUR 500, which currently exceeds the farm's budget. These KPIs highlight both BioHof's limited resources and the potential of small-scale changes to enhance staff resilience.

The enterprise AgroNova, in turn, represents a medium-sized agricultural enterprise in the Lublin Province of Poland, cultivating 500 hectares of land and specializing in cereal crops, particularly wheat and maize. In 2023, floods affected 15 % of its crops (75 ha), and fluctuations in grain prices (a 12 % drop in Q2 2024) created financial difficulties, impacting working conditions and employee morale. In 2024, management conducted a survey of 35 employees to assess the perception of working conditions, motivation and readiness for change in response to these challenges. The results showed that 70 % of respondents (24 people) rated the working conditions as "average": during peak months (June-August), the working day lasted up to 12 hours due to the need to save crops from flooding, but in the off-season (winter), there was not enough work, which created instability. Low motivation was a problem for 60 % of employees (21 people), who complained about salary delays of up to 10 days: the average salary was PLN 2,000 per month (around EUR 450), but due to financial difficulties, payments were sometimes postponed, undermining trust in the employer. Meanwhile, 50 % (17 people) expressed willingness to retrain, particularly in operating drones for field monitoring and fertilizer application, although only five had prior experience with machinery. Following the survey, AgroNova introduced flexible schedules: 25 % of employees (nine people) moved to part-time employment in the off-season (50 % salary, i.e. PLN 1,000/month), which increased the loyalty and reduced workplace tension [51].

In 2024, the director of AgroNova gave an interview [36], describing the personnel management strategies and the enterprise's response to the crises caused by the 2023 floods and market instability. The director explained that floods destroyed 75 hectares of wheat, resulting in the loss of 375 tons of crops with an average yield of 5 t/ha. In addition, grain-price instability in 2024 reduced revenue planning reliability and increased financial pressure on the enterprise. To retain all 35 employees without layoffs, the director decided to invest in retraining: ten people completed a one-week course on drone operation for field monitoring and precision fertilization, which cost PLN 5,000 (partially funded by a grant from the Lublin Chamber of Agriculture). The crisis response also included hiring five seasonal workers from neighboring villages in July-August 2023 to restore drainage systems on flooded fields, helping to save 20 hectares of crops and reduce losses by 10 %. The manager emphasized that the key strategy was maintaining the core team through flexible schedules: nine of the lowest-skilled workers were transferred to part-time contracts during the off-season, which reduced salary costs by 8 % (PLN 12,000 annually). The manager also plans to expand

drone use to cover 50 % of the fields in 2025, although acknowledging that this would require additional PLN 10,000 for equipment and training.

The financial indicators of AgroNova illustrate the impact of external factors and personnel management strategies on the enterprise's economy. In 2023, revenue totaled PLN 500,000: PLN 400,000 from the sale of 500 tons of wheat at PLN 800/t and PLN 100,000 from maize, with 200 tons at PLN 500/t. Flooding reduced the potential wheat harvest by 375 tons, lowering potential revenue by PLN 300,000. In 2024, revenue amounted to PLN 490,000: wheat revenue remained PLN 400,000, while maize revenue decreased to PLN 90,000 due to a smaller harvest of 180 tons at PLN 500/t, reflecting market and climatic instability. Personnel costs remained relatively stable – PLN 150,000 annually for 35 employees: an average salary of PLN 2,000/month per person (70 % of costs), taxes (20 %) and retraining bonuses for ten people (PLN 500/person/year or PLN 5,000 in total). Productivity in 2023 was 5 t/ha for wheat (down from 5.5 t/ha in 2022), and in 2024 declined to 4.8 t/ha due to climate issues, although on 50 hectares where drones were used, it increased to 5.2 t/ha. In 2024, the enterprise invested PLN 10,000 in drainage works and drones, partially offsetting the losses, but overall profitability remained at 5 %, indicating limited financial resilience under the analyzed crisis conditions. AgroNova's personnel KPIs reflect both challenges and successes in HRM under crisis conditions. Plan fulfilment in 2024 was 80 %: instead of the planned 5 t/ha of wheat, 4.8 t/ha was harvested (a total of 2,400 tons from 500 ha), explained by flooding and a lack of staff with drainage skills. Maize also fell short: 180 tons instead of 200 due to excessive moisture, lowering total performance to 90 % of the plan. Staff turnover was 20 %: 7 of 35 employees (mainly seasonal) left the enterprise in 2023 ÷ 2024 due to salary delays and job instability, although flexible schedules helped retain five of them in part-time roles. Training effectiveness was relatively high – 70 %: 10 of 35 employees successfully learned to operate drones during a one-week course in January 2024, which raised productivity on 50 hectares from 4.8 to 5.2 t/ha. These workers received bonuses (PLN 50/month for ten months), which improved the motivation, but the remaining 25 employees did not receive training due to a lack of funds (additional PLN 10,000 is needed for full coverage). In 2025, management plans to increase training effectiveness to 85 % by expanding retraining programs with local grant support.

DLG Group is one of the largest agroholdings in Denmark, cultivating 200,000 hectares of land and specializing in cereal production (wheat, barley) and pig farming (50,000 heads annually). In 2023, increased humidity caused by abnormal rainfall (30 % above average – 900 mm instead of 700 mm per season) disrupted logistics, delaying grain transportation to ports by two weeks, which impacted work processes and staff workload. That same year, the company conducted a survey of 1,500 employees to assess the perceptions of working conditions, motivation and readiness

for change in response to these climate-related challenges [16]. The results showed high satisfaction levels: 80 % of respondents (1,200 people) rated working conditions positively thanks to modern equipment (GPS-equipped tractors, automated feeding systems on farms) and safety measures such as mandatory annual occupational health and safety training – covering 100 % of staff. Motivation stood at 65 % (975 employees), largely due to social packages: health insurance worth DKK 2,000/year per employee (approx. EUR 270), quarterly bonuses of up to 10 % of salary (average salary – DKK 30,000 or EUR 4,000/month), and additional leave days for length of service. However, only 55 % (825 people) were ready for change – particularly transitioning to precision farming using digital platforms – due to the complexity of software and a lack of prior experience among 40 % of workers. In 2024, the company organized training for 300 employees, which increased readiness to 70 %, demonstrating the effectiveness of a targeted personnel development approach.

According to the DLG Group manager [13], abnormal rainfall led to a 5 % loss of wheat yield (12,000 tons from the planned 240,000 tons) due to delays in harvesting and transportation, as well as additional logistics costs of DKK 1.5 million (approx. EUR 200,000). The core strategy involved implementing digital platforms for 200 managers responsible for coordinating fieldwork and logistics: a system worth DKK 500,000 helped reduce machinery downtime by 15 % and optimize delivery routes. The crisis response also included large-scale training: in 2024, 300 employees (20 % of staff) completed a two-month precision farming course (using moisture sensors, drones), costing DKK 2 million, which improved efficiency by 10 % across 50,000 hectares. The manager emphasized that retaining the workforce of 1,500 was a top priority: rather than downsizing, the company converted 100 seasonal workers into permanent employees with benefits packages – helping reduce the risk of staff loss. The manager also mentioned 2025 plans to invest a further DKK 3 million into pig farming automation to reduce dependence on weather conditions, acknowledging that this would require retraining additional 200 employees.

DLG Group's financial indicators reflect the stability of a large agroholding even under difficult climatic conditions, along with significant investments in personnel as a key resource. In 2023, revenue reached DKK 50 million (approx. EUR 6.7 million): DKK 35 million from selling 230,000 tons of grain (average price of DKK 150/t) and DKK 15 million from pig farming (50,000 heads at DKK 300/head), despite losses due to humidity. In 2024, revenue increased to DKK 52 million thanks to a 5 % rise in productivity following the implementation of precision farming, although logistics costs rose by 10 % (DKK 2 million) due to the need to rent additional storage facilities. Personnel costs amounted to DKK 15 million per year for 1,500 employees: average salary – DKK 30,000/month (DKK 12 million), social packages (DKK 2 million, including insurance and bonuses) and training (DKK 1 million for 300 employees in

2024). Grain productivity in 2023 was 6 t/ha (down from 6.2 t/ha in 2022), but increased to 6.5 t/ha across 50,000 hectares in 2024 with precision farming, while productivity in pig farming remained stable – 1 ton of meat per head per year. Investments in technology (DKK 5 million in 2023-2024) partially offset climatic losses, and profitability remained at 12 %, a typical figure for Denmark's agro-sector. DLG Group's personnel KPIs demonstrate strong stability and performance at a large enterprise, along with successful adaptation to change. Plan fulfilment in 2023 was 90 %: 230,000 tons of grain were harvested versus the planned volume of 240,000 due to humidity, while pig farming achieved 100 % of its target (50,000 heads), showing the resilience of that segment. In 2024, fulfilment increased to 92 % (235,000 tons of grain) thanks to precision farming, although logistical delays continued to affect fieldwork. Staff turnover was low – 10 %: 150 of 1,500 employees left the company in 2023-2024, mostly due to relocation or retirement, not dissatisfaction with conditions. Social packages and the conversion of 100 seasonal workers into permanent staff helped retain the core team. Training effectiveness reached 85 %: 300 of 1,500 employees successfully completed precision farming training in 2024 (DKK 2 million), increasing productivity on 50,000 hectares from 6 to 6.5 t/ha and reducing fertilizer use by 5 % (DKK 500,000). The remaining 1,200 employees still use basic technologies, but the company plans to train 200 more in 2025 (DKK 1.5 million) to raise overall effectiveness to 90 % and prepare them for automation in pig farming. These KPIs underline DLG Group's ability to scale innovations and maintain workforce stability.

Table 1 clearly illustrates the effectiveness of the implemented measures at the enterprises studied, comparing key financial indicators and personnel KPIs "before" and "after" implementation, with adapted data to clearly show the changes.

Based on enterprise data and examples, several human resource management (HRM) models relevant to Ukraine were identified.

Model 1: Flexible employment with motivational bonuses. The experience of the BioHof farm demonstrates the effectiveness of a flexible employment model with small motivational bonuses for small agricultural enterprises. For Ukraine, where small farmers (e.g. in Vinnytsia or Khmelnytskyi regions) often face labor shortages due to seasonality and low income, this model can be adapted through the introduction of flexible schedules (e.g. 50 % employment during the off-season) and bonuses in hryvnias (UAH 500 ÷ 1,000/month) for mastering simple technologies such as drip irrigation. Funding can be partially covered by grants from local communities or EU programs. The examples of such enterprises include several small organic farms, such as Danube Agrarian (Ukraine, Odesa region) [14] and Ekološka Kmetija Černelič (Slovenia) [18]. At Danube Agrarian, bonuses of UAH 700/month were successfully implemented in 2023 for five employees, reducing turnover from 30 % to 15 %. At Ekološka Kmetija Černelič, flexible working schedules were introduced in 2023 for six employ-

ees, along with EUR 40/month bonuses for using organic farming methods, which increased employee engagement from 60 % to 80 %. Thus, this model enables staff retention and improved productivity under limited resources.

Table 1. Comparison of key financial and HR KPIs at EU companies

Indicator	BioHof (Austria)	AgroNova (Poland)	DLG Group (Denmark)
Enterprise size	Small, 40 hectares	Medium, 500 hectares	Large, 200,000 hectares
HRM measures	Short-term contracts, bonuses (EUR 50/month), irrigation	Flexible schedules, retraining (drones), drainage	Trainings (precision farming), digital platforms
Financial indicators			
Revenue	Before: EUR 60,000 (2023) After: EUR 65,000 (2024)	Before: PLN 500,000 (2023) After: PLN 490,000 (2024)	Before: DKK 50 million (2023) After: DKK 52 million (2024)
Personnel costs	Before: EUR 80,000/year After: EUR 81,200/year (with bonuses)	Before: PLN 150,000/year After: PLN 138,000/year (flexibility)	Before: DKK 15 million/year After: DKK 16 million/year (training)
Productivity	Before: 20 t/ha After: 22 t/ha (for 10 ha with irrigation)	Before: 4.8 t/ha After: 5.2 t/ha (for 50 ha with drones)	Before: 6 t/ha After: 6.5 t/ha (for 50,000 ha)
Personnel KPIs			
Implementation of plans	Before: 75 % (20 t/ha instead of 25 t/ha) After: 85 %	Before: 80 % (4.8 t/ha) After: 85 % (with drones)	Before: 90 % (230,000 tons) After: 92 % (235,000 tons)
Staff turnover rate	Before: 25 % (2 out of 8 left) After: 12.5 % (1 in 8, forecast)	Before: 20 % (7 out of 35 left) After: 14 % (5 out of 35)	Before: 10 % (150 out of 1500) After: 8 % (120 out of 1500)
Learning effectiveness	Before: 0 % (without tuition) After: 60 % (4 out of 8 have mastered irrigation)	Before: 0 % (without drones) After: 70 % (10 out of 35 mastered drones)	Before: 55 % (readiness) After: 85 % (300 out of 1,500 trained)

Explanatory notes: source: developed by the authors based on [16, 43, 51].

Model 2: Retraining with a focus on technology and seasonal support. AgroNova in Poland offers a model combining staff retraining with seasonal support for medium-sized agricultural enterprises facing climate and market crises. The examples of such enterprises include medium-sized farms such as Agro Vysocina (the Czech Republic) [4] and Polissya Grain (Ukraine, Zhytomyr region) [44]. At Agro Vysocina, training was conducted in 2023 for 12 employees to work with precision farming systems at a

cost of CZK 120,000, which increased yields by 7 %, and seasonal support (15 employees for three months) helped address flooding. At Polissya Grain in 2024, eight employees were retrained for UAH 25,000 to use crop monitoring, which improved yields by 10 %, while hiring ten seasonal workers (UAH 600/week) during harvest ensured production stability. For Ukraine, where medium-sized farms (e.g. in Odesa or Poltava regions) suffer from floods and price fluctuations (a 10 ÷ 15 % drop in wheat prices in 2024), this model is relevant due to technology availability and the need for adaptation. Retraining in drones or monitoring systems may cost UAH 20,000-30,000 for five ÷ ten workers, partially subsidized through Polish-Ukrainian agro programs, and the involvement of seasonal workers (UAH 500 ÷ 700/week) during crisis months will help distribute workloads. This will enhance the resilience of medium-sized farms to external factors and optimize costs.

Model 3: Large-scale training and digital coordination. The enterprise DLG Group in Denmark illustrates a model of large-scale training and digital coordination for large agroholdings, which can be adapted for Ukraine. For large Ukrainian agroholdings such as Kernel [27] and MHP [38], which cultivate hundreds of thousands of hectares and face logistical challenges due to war and climate (abnormal precipitation in 2023), this model is realistic due to access to international funding. For example, in 2023, MHP spent UAH 50 million on retraining 1,000 employees, which reduced turnover from 20 % to 12 %. Adaptation may include training 500 ÷ 1,000 employees (UAH 10-15 million) to work with drones and sensors, and the introduction of digital systems supported by USAID (USD 5 million for agro-innovation in 2023). This will increase the productivity and resilience of major players under uncertain conditions.

It should be noted that the analysis of case studies of three differently scaled enterprises revealed common challenges faced by agribusiness: labor shortages, insufficient employee engagement in task performance and the need to quickly adapt to changing conditions. At small enterprises, it is difficult to retain staff due to harsh working conditions and limited income, reflecting the realities of small farmers in Ukraine [25, 29, 59]. Medium-sized farms suffer from staff demotivation due to unstable payments, exacerbated by market fluctuations typical of the Ukrainian agro-sector. Large companies feel the need for flexibility, as employees are not always willing to master complex innovations – a pressing issue for agroholdings facing climatic and logistical difficulties. The case studies showed that the best results are achieved by combining employee training, incentivizing the activity, and implementing flexible working conditions. At the small scale, simple incentives and temporary contracts help retain staff and increase the engagement. Medium-sized enterprises benefit from retraining and adaptive schedules, which allow for resource optimization during crisis periods [1, 33]. Large structures succeed through large-scale training and digital tools

that improve coordination and efficiency. These approaches are universal and can serve as a basis for overcoming difficulties in agribusiness.

Several HRM improvement areas for Ukrainian agricultural producers are presented in Figure 1.

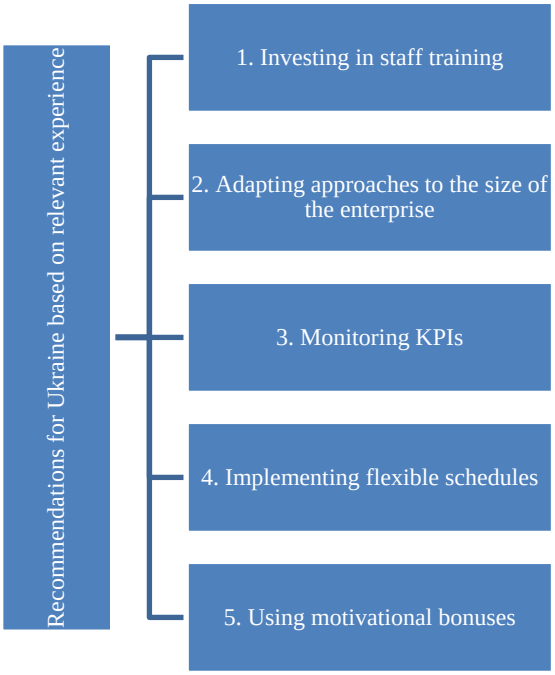

Figure 1. Proposed recommendations for improving HRM for Ukrainian enterprises based on relevant experience
Explanatory notes: source: developed by the authors.

Thus, Ukrainian enterprises should focus on the long-term development of personnel through upskilling programs, which will help them adapt to modern requirements. A regular analysis of employee performance also enables problems to be promptly identified and HRM strategies adjusted. In addition, it is important to consider the scale of the farm and regional specificities, applying simple incentives for small farms, technological solutions for medium-sized ones and complex innovations for large enterprises to ensure maximum suitability for conditions. To understand staff needs, agro-enterprises should develop a universal survey template that covers key aspects: working conditions comfort, motivation factors and readiness for change [17]. Such a tool, inspired by case experiences, helped small farms identify dissatisfaction with conditions, while medium-sized ones detected payment issues. In Ukraine, such

surveys can be conducted regularly to respond promptly to staff sentiments and adjust management approaches.

A retraining program based on case practices involves a short course with theoretical and practical parts to master modern technologies such as drones or irrigation systems. The experience of medium and large enterprises showed that even basic training improves productivity and adaptability. For Ukraine, this may be an accessible organizational solution supported by grants, adapted to the needs of both small and large farms. A motivation system, considering the seasonal nature of agricultural production, can combine stable base pay with additional incentives for activity during peak periods. Cases show that simple bonuses and flexible conditions help retain workers at small and medium-sized enterprises, while broader social packages are effective for large ones. In Ukraine, this may be implemented through small rewards for minor farms and comprehensive incentives for agroholdings to maintain loyalty throughout the year. Thus, the analyzed case experiences highlight that strategic personnel management can transform agribusiness into a resilient system, overcoming external challenges through workforce development and performance optimization. At different levels – from small farms to large holdings – HRM contributes to increasing productivity, retaining staff and adapting to change, which is critically important for Ukraine under climate and economic shocks. It becomes a tool for solving current problems, as well as preparing the sector for future challenges.

Discussion

In the course of this study, the experience of human resource management at the small enterprise BioHof (Austria) was analyzed, allowing key challenges and effective HRM strategies relevant to small agro-enterprises, including those in Ukraine, to be identified. The results showed that introducing simple motivational incentives, such as bonuses of EUR 50 per month for mastering organic irrigation, significantly increased employee engagement (from 50 % to 75 %) and reduced staff turnover (from 25 % to projected 12.5 %), as well as partially restoring productivity after the 2023 drought. This indicates that even with limited resources, small farms can achieve resilience through accessible HRM approaches that do not require significant investment. For Ukraine, where small farms, for example in Vinnytsia or Kherson regions, often face staffing shortages and climatic difficulties, these findings underscore the potential of such strategies for staff retention and improved efficiency during crises. However, the analysis also revealed that success depends on workers' willingness to acquire new skills, which requires at least minimal training – something that may be complicated for low-budget farms. Thus, the experience analyzed showed that HRM for small enterprises should focus on simple, yet targeted measures that can be adapted to local realities to offset the vulnerability of this agribusiness segment. In the work of Gittins

and McElwee [24], the importance of adaptive business strategies for farms and agricultural enterprises was also highlighted, noting the relevance during crises, but without examining the effect on long-term employee loyalty, which limits the practical significance of the findings. The work of Anwar et al. [5] analyzed retraining programs for agricultural enterprises, enabling an understanding of the potential to turn traditional farmers into professionals, though without considering the impact of climate crises on the effectiveness of such measures. The study by Van Hoa et al. [58] examined personnel management strategies at agro-enterprises, emphasizing the implementation of technologies and international standards to improve accounting and auditing, but did not analyze how limited resources affect the implementation. In the work of Salam and Munawir [49], the role of innovative technologies in improving the efficiency of farms and agricultural enterprises was explored, highlighting the effectiveness and productivity, but without considering the impact on employee motivation in stressful conditions. Thus, the results of this study broadly align with previous research, confirming the effectiveness of motivational and adaptive HRM approaches for small farms, while also complementing them with a broader analysis of the influence of climatic and resource constraints on personnel management.

The study also analyzed the HR management experience at the enterprise AgroNova (Poland), which enabled the identification of challenges and strategies relevant for medium-sized agro-enterprises. As a result of the analysis, it was noted that retraining ten employees to operate drones (at PLN 5,000) increased productivity from 4.8 to 5.2 tons per hectare across 50 ha, and introducing flexible schedules for nine people reduced personnel costs by 8 % and lowered turnover from 20 % to 14 %, helping to counter the 2023 floods and price fluctuations. Thus, medium-sized farms can effectively adapt to crises through accessible technologies and flexible management, which do not require large-scale resources, but do require targeted investments in organizational HR management changes. In the context of Ukraine, where medium-sized farms, for example in Poltava or Odesa regions, face similar climatic and market problems, these results underscore the importance of HRM for enhancing resilience and competitiveness under limited funding. At the same time, the analysis revealed that success depends on the initial skill level of employees and the availability of at least minimal external funding (e.g. grants), which may be a barrier for farms without access to such resources. All this confirms that for medium-sized enterprises, HRM should combine technological development and flexibility to optimize workforce performance in unstable conditions. In the work of Ullah et al. [56], the role of strategic human resource management in managing farms and agricultural enterprises was also explored, noting the examples of successful adoption of technologies and methods, but without considering the impact of economic crises on the effectiveness. The work of Ferreira et al. [22] analyzed HRM approaches to managing seasonal workers, providing valuable

insights into flexibility in personnel management, but did not explore how these approaches affect long-term productivity. The work of Carpio and Urbano [11] examined strategies for increasing employee satisfaction at agro-enterprises, also highlighting the potential of coaching and worker motivation, but did not investigate the dependence on external funding for the implementation. The study by Santhanam-Martin et al. [50] analyzed HRM approaches to staff engagement at agricultural enterprises, also focusing on staff retention aspects, but without studying how these approaches affect workforce stability in the off-season. Comparing the results of this study with those mentioned, it should be noted that this study expands the conclusions regarding HRM by considering the broader context of climatic and financial constraints, making its findings more comprehensive and practice-oriented.

Through the analysis of HR management experience at the large enterprise DLG Group (Denmark), the main challenges and measures relevant to large enterprises in the agricultural sector were also identified. Specifically, it was noted that investing DKK 2 million in training for 300 employees increased productivity from 6 to 6.5 tons per hectare across 50,000 ha and reduced logistics downtime by 15 %, while digital coordination for 200 managers optimized management under excessive humidity conditions in 2023, raising profitability from 50 to 52 million kroner in 2024. These results demonstrate that large enterprises can achieve significant outcomes through large-scale HRM programs and technological integration, which require substantial resources, but ensure resilience in crisis situations. Analyzing this experience in the Ukrainian context, where large agroholdings such as Kernel or MHP face logistical issues due to war and climatic anomalies, the findings highlight the potential of HRM to increase efficiency and competitiveness, given access to funding. At the same time, the analysis revealed that success depends on a high level of organization and the willingness of a significant number of workers (only 55 % were willing to change without training), which may be a challenge for Ukrainian holdings with less developed HRM infrastructure. In the work of Qorri et al. [47], the role of human resource management under agro-enterprise conditions was also studied, focusing on the effectiveness of HRM strategies in labor-saving technologies, but without considering the impact of climatic factors on these processes. In the work of Vrabcová and Urbancová [60], methods of human resource management in agribusiness using information systems were examined, offering valuable insights into innovative technologies in the field, but without considering how employee training affects the performance. In the study by Lawton et al. [34], HRM approaches to staff motivation on farms were analyzed, emphasizing the potential for large enterprises, but not exploring the dependence on infrastructure for implementation. In the work of Farida [20], innovative HRM methods for improving enterprise productivity in agro-companies were studied, which made a valuable contribution to understanding global trends, but without analyzing the impact of initial

employee readiness on the success of such methods. Comparing the results of the present study with those of the aforementioned works, it should be noted that the findings confirm the importance of large-scale HRM initiatives and technologies for large enterprises, but this study complements them with a more comprehensive approach, considering climate challenges, organizational aspects and the level of staff preparedness, making its conclusions more holistic.

A crucial part of the findings of this study was the development of recommendations for Ukraine based on the analysis of HRM practices of European enterprises of different scales, which made it possible to propose adaptive strategies for improving agribusiness efficiency under local challenges. Thus, it was noted that simple incentives (e.g. bonuses) are appropriate for small farms to increase engagement and reduce turnover; for medium ones – retraining and flexible schedules to optimize productivity and costs; and for large enterprises – large-scale training and digital coordination to ensure resilience and competitiveness. These recommendations highlight that HRM can be a flexible tool adapted to the scale of farms and the specific context of Ukraine, where climate anomalies (droughts, floods) and the war, which caused a 40 % drop in 2022 ÷ 2023 exports , exert pressure on the sector. The analysis confirms that success depends on access to resources (grants, infrastructure) and employee readiness for change, requiring coordination with state and international programs. For Ukraine, this means an opportunity to minimize losses (e.g. 30 % of crops due to droughts) and prepare for future transformations, such as automation. Thus, the recommendations developed offer a practical approach to strengthening the agricultural sector through HRM, taking into account its diversity and current realities. In the work of Maican et al. [37], HRM strategies for farms were also proposed, focusing on employee motivation and satisfaction with working conditions, but without considering the impact of climate crises on the effectiveness. In the work of Ashraf et al. [6], qualification approaches in the agro-sector without production disruption under climate change conditions were analyzed, offering valuable insights into human potential management, but without exploring the adaptation to market instability. The study by Dimovski et al. [15] examined the impact of HRM for enterprises, highlighting the potential to increase competitiveness in agro-enterprises, but without considering the enterprise's dependence on external funding. In the work of Reis and Alves [48], methods for increasing workforce flexibility in agribusiness were studied, contributing to the development of human capacity, but not considering how farm scale affects implementation. Comparing the results of this study with those of the aforementioned works, it should be noted that the results generally align in highlighting the importance of HRM for the agro-sector. However, this study stands out for its broader coverage, taking into account the diversity of farm sizes, climatic conditions and market instability, offering more integrated

and contextually relevant recommendations, emphasizing the practical significance of the findings and wide applicability.

Thus, the analysis of international experience, combined with a review of previous research, showed that human resource management is critically important for increasing the efficiency and adaptability of agribusiness to climate, economic and social challenges, and the results of this work complement and expand the conclusions of the studies cited. While previous studies focused on individual HRM aspects – such as motivation, retraining or technology integration – this work proposes a comprehensive approach adapted to different farm scales (small, medium, large) and the specific conditions of Ukraine, considering its unique context, such as war and climate anomalies. All this highlights that HRM can become a driver of agribusiness resilience and competitiveness, and development in this area will form the basis for practical recommendations and further sector development under uncertainty.

Conclusions

1. As a result of this study, the experience of three European agro-enterprises – the small BioHof, the medium AgroNova, and the large DLG Group – was analyzed, and the main challenges faced by agribusiness in the field of personnel management were identified, such as staff shortages, low employee motivation and the need for flexibility. These problems reflect the situation in Ukraine, where seasonality, climatic anomalies and economic instability lead to high staff turnover and reduced productivity.
2. The analysis of case experiences made it possible to identify the most effective human resource management strategies, including training, motivational incentives and flexible schedules. At BioHof, the analysis showed that introducing EUR 50 monthly bonuses increased staff motivation to 75 % and reduced turnover to projected 12.5 %, helping adaptation to climate difficulties. AgroNova demonstrated a retraining success: mastering drone operation increased productivity from 4.8 to 5.2 tons per hectare, and flexible schedules reduced personnel costs by 8 %. DLG Group, through training, achieved productivity growth from 6 to 6.5 tons per hectare and reduced logistics downtime by 15 %.
3. The experience analyzed highlighted that strategic human resource management plays a decisive role in increasing agribusiness resilience to external challenges. At BioHof, simple HRM measures such as bonuses and short-term contracts helped maintain basic profitability during difficult times. AgroNova, through adaptive approaches, maintained income stability during crises, while DLG Group, through large-scale training and digital solutions, achieved income growth by several percentage points. It was noted that for Ukraine, where the agro-sector suffers from climate change and war (a 35 % drop in income), HRM can become a tool for re-

source optimization, staff retention and adaptation to instability, strengthening the competitiveness of both small farms and large agroholdings.

4. Given the case analysis, recommendations were developed for Ukraine, taking into account the specificities of farms of different sizes: small farms are offered simple incentives for staff retention, medium ones – retraining to increase productivity and large ones – large-scale personnel development programs for implementing innovations. These models can strengthen the resilience of the Ukrainian agro-sector, which has faced serious challenges due to external factors.
5. It is worth noting that this study has limitations related to the analysis of only three cases, which does not cover the full spectrum of agro-enterprises or regional specifics of Ukraine, as well as does not pay sufficient attention to the long-term effects of the strategies proposed. For further research, promising topics include the impact of automation, which may reduce dependence on human labor, as well as global trends such as EU climate standards or the growing demand for organic products, which will form new requirements for HRM in agribusiness.

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STRATEGICZNE ZARZĄDZANIE ZASOBAMI LUDZKIMI W AGROBIZNESIE W OBLICZU ZMIAN KLIMATU I NIESTABILNOŚCI RYNKU: WYZWANIA ORGANIZACYJNE I MODELE ADAPTACYJNE

S t r e s z c z e n i e

Wprowadzenie. Celem niniejszego badania była analiza doświadczeń w zakresie zarządzania zasobami ludzkimi w przedsiębiorstwach Unii Europejskiej oraz opracowanie rekomendacji mających na celu poprawę odporności agrobiznesu na Ukrainie. Metodologia badań opierała się na analizie porównawczej danych pierwotnych (ankiety pracownicze i wywiady z menedżerami przeprowadzone w latach 2023 ÷ 2024) i źródeł wtórnych (sprawozdania finansowe i kluczowe wskaźniki efektywności z lat 2022 ÷ 2024) trzech przedsiębiorstw rolnych – BioHof, AgroNova i DLG Group – z adaptacją wyników do warunków ukraińskich.

Wyniki i wnioski. Wyniki badania pokazały, że strategiczne zarządzanie zasobami ludzkimi odegrało decydującą rolę w zapewnieniu odporności agrobiznesu na wyzwania zewnętrzne, takie jak zmiana klimatu i niestabilność gospodarcza, co potwierdza analiza doświadczeń międzynarodowych. W BioHof wprowadzenie miesięcznych premii w wysokości 50 euro zwiększyło motywację pracowników z 50 % do 75 % i zmniejszyło rotację personelu z 25 % do prognozowanych 12,5 %, umożliwiając małemu przedsiębiorstwu częściowe zrekompensowanie strat poniesionych w wyniku suszy w 2023 roku, kiedy to plony warzyw spadły z 25 do 20 ton z hektara. AgroNova przeszkoliła 10 pracowników w zakresie obsługi dronów, zwiększając wydajność z 4,8 do 5,2 ton z hektara na obszarze 50 ha, a elastyczny harmonogram pracy obniżył koszty osobowe o 8 %, pomagając średniej wielkości gospodarstwu przetrwać powodzie i wahania cen. Grupa DLG zainwestowała 2 miliony koron w szkolenia 300 pracowników, co pozwoliło na zwiększenie wydajności z 6 do 6,5 tony na hektar na obszarze 50 000 ha i skrócenie przestojów logistycznych o 15 % w okresie wysokiej wilgotności w 2023 roku. Wyniki te miały szczególne znaczenie dla Ukrainy, ponieważ w 2023 roku sektor rolny zatrudniał 2,5 miliona osób, a rotacja kadr sięgała 20 ÷ 30 % z powodu sezonowości, niskich dochodów, wojny i anomalii klimatycznych. Na podstawie przeprowadzonej analizy opracowano praktyczne rekomendacje dla ukraińskich producentów rolnych, w tym wdrożenie

elastycznych harmonogramów pracy, premii motywacyjnych i programów przekwalifikowania, które mogłyby przyczynić się do stabilności poprzez optymalizację zasobów i poprawę wydajności.

Słowa kluczowe: rotacja kadr, szkolenia pracowników, motywacja pracowników, kluczowe wskaźniki efektywności (KPI), produktywność