PROCUREMENT MANAGEMENT SYSTEMS AND ASSESSMENT OF THE MODERNITY OF AGRICULTURAL PROCUREMENT PROCESSES

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ABSTRACT

This paper examines procurement management systems and the perceived modernity of agricultural procurement processes in Croatian companies. The research was conducted on a sample of 101 respondents from companies operating in agricultural production and related agri-food supply chains. Data were collected through a questionnaire and analyzed using descriptive statistics and analysis of variance. The results show that centralized and partially centralized procurement systems predominate, while decentralized systems are rarely used. Most respondents assess their procurement systems as partially modern, indicating room for further organizational and technological improvement. The analysis did not confirm statistically significant differences in the perceived modernity of procurement systems among small, medium-sized and large companies. The findings suggest that agricultural companies recognize the importance of procurement modernization, but that further investment in digital tools, process improvement and staff education is needed to strengthen procurement efficiency and competitiveness.

Introduction

Efficiency is analyzed through quantitative modelling and is represented by the financial indicators Order Cost, Administrative Cost, Lead Time Opportunity Cost and Opportunity Cost of Capital. The remaining five benefits (decentralisation, transparency, control, maverick-buying reduction, supply-base rationalisation) are

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related to organisational performance and assessed qualitatively (Ronchi et al., 2010). A comprehensive business case should include all direct costs for the services being provided as well as the indirect costs associated with managing the supplier–customer relationships and those incurred from risk management activities (Walker & Rowlinson, 2008). The procurement system, it was claimed by the contractors and the stakeholders, made selection based on cronyism, personal relationship rather than on professional standing. At that time, the tender board was seen as the ultimate decision-maker and nobody could contest their choice of selection. The procurement officers were blamed for malpractice and non-compliance with the policies and procedures of the procurement system (Shu Hui et al., 2011). The delivery method should have the following functions to achieve the owner's goal, including the time estimation as accurate as possible when signing the contract; incentive mechanisms to ensure the work of the planning, design, pre-construction preparation, construction, procurement stages be shortened (Alhazmi & McCaffer, 2000). Local purchasing units are typically better informed than the centre on the product characteristics that they need but sometimes may find it costly, or inconvenient, to transfer this information to the centre (Dimitri et al., 2006).

The impact of digitisation towards procurement has a positive character and organisations should take the future role of procurement and strategic network node into account when aligning its procedures and processes towards the digital strategy (Bienhaus & Haddud, 2018). E-procurement brings about important simplifications of the MRO procurement process and reduces this operational workload for buyers by decentralizing the operational procurement process (Puschmann & Alt, 2005). Cui et al., (2022) explored how a buyer's AI strategy would affect the wholesale price received from suppliers. By designing and conducting a randomized field experiment, they find that having a purely autonomous request-for-quotation process results in a higher price quote—that is, suppliers price-discriminate a not-so-smart chatbot buyer.

Literature review and hypothesis

Supplier selection, which sets out to choose adequate suppliers to whom services will be contracted-out; and supplier evaluation, which assesses the performance of suppliers who are already working with the company (de Araujo et al., 2017). One of the key changes to procurement directives is the need for "compulsory e-procurement" with fully electronic procurement, including the online submission of tenders, being required by June 2016. There is however a down side in this new initiative in that, the application of e-procurement platforms requires significant investment in both specialist software and staff training (Naoum & Egbu, 2015). The ability to „punch out" procurement order data into financial control systems is regarded as a critical requirement for the success of an e-procurement system and thus close integration with finance systems was identified as an important criteria (Croom & Brandon-Jones, 2005). Controlling for purchasing costs is also fundamental for private companies to compete in the global economy. Cost control is crucial for firms to remain in business when economies do not grow, or grow very little, since demand is likely to be weak and firms' revenues low (Dimitri et al.,

2006). Products based on sugar and chocolate can have the epithet of luxury products and the increase in prices has a statistically significant impact on the growth of demand (Mladenović et al., 2024). Procurement strategy should be developed that balances risk against the project objectives that are established at an early stage (Davis et al., 2008).

There is a strongly positive and statistically significant link between aspects of sustainable procurement that are oriented on environmental and labour health and safety and procurement from small and local businesses (Walker & Brammer, 2012). It is not only a problem to ensure an adequate volume of agricultural production for the normal functioning of the supply chain, but also to influence the prices of agricultural products (Dejanović, 2023).

Strategic supplier portfolio perspectives considering risks, trade-offs and interdependencies of relationships between the firm and its suppliers were developed (Wagner et al., 2013). A natural way to introduce moral hazard would be to allow for an initial, costly investment, which affects the distribution of quality. Since there is no screening mechanism to enable an uninformed buyer to distinguish among sellers who have invested in different levels of e, a trading mechanism only increases the likelihood that the seller will not actually be the end user of the product. The possibility of a trade exacerbates the incentive to shirk. A more general optimization problem can be constructed which takes this behavior into account but, of course, the linearity of the objective function disappears (Manelli & Vincent, 1995). Love et al. (1998) suggested that participants have to put aside their own objectives by considering the clients strategic project objectives in a holistic manner. This can be effectively achieved through the use of a project management organisation which acts as a control mechanism for the client and participants.

While the latter could be attributed to factors such as budgetary constraints and low levels of diffusion, it is somewhat concerning that the sample is heavily skewed towards technology that was adopted over a decade ago (McCue & Roman, 2012). Progress within the traditional procurement function can be slow to gain traction. For example, there can be varying levels of resistance to change and a reluctance to shift away from the existing systems, especially when investments create structural changes in business processes (Rejeb et al., 2018). It was widely acknowledged that there seems to be an internal politico-cultural glass ceiling preventing procurement professionals from being involved in organisation-wide business strategic decision-making (Tassabehji & Moorhouse, 2008). It may well be that corruption is higher in a more competitive environment. This is not to say that increases in competition are not desirable, as in fact they may be beneficial, but to highlight that a cost associated with tougher competition may be higher corruption and that it is reasonable to expect that corruption and competition will grow together in certain markets (Celentani & Ganuza, 2002). Starting with the overall model, it confirms that clients' desire to involve contractors in specification triggers them to perform cooperative procurement procedures (Eriksson & Pesamaa, 2007). Asker & Cantillon, (2010) characterize the optimal sequential procedure, i.e. the mechanism that maximizes the buyer's expected utility conditional on approaching suppliers at most once. Now that physical distances have become less important through reduced transportation costs and

fast communication, cultural and institutional distance can still be large (den Butter & Lins, 2008). Economic criteria such as payment conditions, i.e. the price of the product itself, as well as the supplier's willingness to negotiate, quick response to inquiries and complaints, as well as openness to stable cooperation, still play a major role (Nedeljković et al., 2025). Serious strategic procurement actively controls its costs, which in the case of energy means monitoring legal frameworks, subsidies, and energy prices in relevant markets.(Galić et al, 2024). Despite extensive research on procurement structures, limited empirical studies focus specifically on procurement systems within agricultural enterprises, particularly in transitional economies. This research aims to address that gap

For the purposes of establishing quality research and conclusions, basic hypothesis were set:

H1: Centralized purchasing systems are dominant in organizations compared to decentralized models.

Materials and methods

This research applied a scientific approach to analysis by deconstructing the concept of competitiveness into its basic components, including the competitive position of procurement, strategic orientation, relevance and effectiveness of procurement management, modernity of procurement systems, and level of employee motivation. Relations with suppliers and customers and the quality of cooperation with them were also analyzed, with special emphasis on the mutual interactions of these elements. In the process of generalizing the methodological frameworks used, specific aspects of competitiveness were considered within a broader context, with individual factors analyzed as interconnected wholes. For example, elements related to the competitive position of procurement were viewed as a single functional unit, while aspects related to suppliers, employee motivation, and other key variables were considered in a similar manner, in order to maintain analytical consistency. The research was specifically conducted among companies operating within agricultural production and related agri-food supply chains. The descriptive analysis method was applied to interpret the characteristics of the competitive position of procurement, relationships and levels of satisfaction in interactions with suppliers, and employee motivation. The following scientific methods were used in the research:

Survey – This method collected data on competitiveness from various aspects, with the respondents being company executives, procurement managers, and managers in the agricultural production sector. In addition, the survey collected data on the competitive position in the agricultural products market from the perspective of customers.

Scaling – The research applied the Likert rating scale, which is one of the most commonly used methods in the social sciences. This technique was implemented in questionnaires intended for procurement executives and managers. To achieve the research objectives and test the hypotheses related to the research, several statistical methods were applied with the aim of obtaining key statistical values. The selection of these methods was aligned with the characteristics of the defined variables, and data processing was carried out using IBM SPSS Statistics 20. For this purpose, the following statistical procedures and measures were applied:

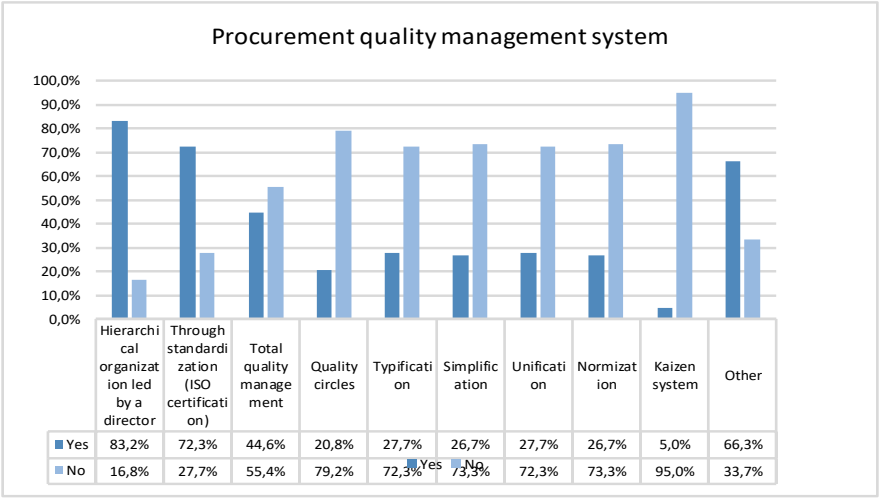
- Calculation of frequencies and shares (percentages)
- Descriptive statistics
- Measures of central tendency: arithmetic mean (M)
- Measures of variability: standard deviation (SD)
- Analysis of variance (ANOVA)
- Graphical and tabular presentation of results

In addition, histograms were used as a visual tool for displaying data arranged in certain categories or groups, which allowed the research results to be presented both graphically and in tabular form. The respondents were company executives, procurement managers, sales managers, and managers in the agricultural production sector. The sample consisted of 101 respondents.

Results and discussions

The findings provide insight into the structure of procurement systems within the agricultural sector. Surveyed companies predominantly utilize the hierarchically structured procurement quality management system (83.2%) and the procurement quality management system certified through standardization (ISO certificate) (72.3%). A minority of companies operate with comprehensive quality management systems which represent 44.6%. The Kaizen system is the procurement quality management system with the smallest representation at only 5%. The research examined both procurement system orientation and procurement system types with visual data presented in Figure 2. Figure 1 displays the results of an examination into various procurement quality management systems based on procurement system orientation.

Figure 1. Procurement quality management system

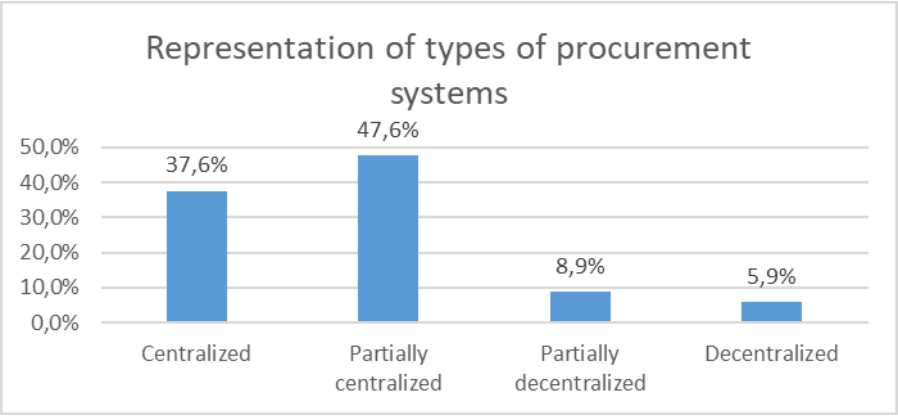


	Hierarchical organization led by a director	Through standardization (ISO certification)	Total quality management	Quality circles	Typification	Simplification	Unification	Normization	Kaizen system	Other
Yes	83,2%	72,3%	44,6%	20,8%	27,7%	26,7%	27,7%	26,7%	5,0%	66,3%
No	16,8%	27,7%	55,4%	79,2%	72,3%	73,3%	72,3%	73,3%	95,0%	33,7%

Source: Authors

The results indicate (Figure 1) that the most common procurement system is centralized (37.6%) and partially centralized (47.6%) compared to decentralized (5.9%) and partially decentralized (8.9%). Based on the results obtained, we can only conclude that the majority of the surveyed companies have a centralized and partially centralized procurement system, but we do not know which units are centralized and which are decentralized, and therefore we cannot make an assessment of whether the companies have desirable procurement systems. Both types of procurement systems have their advantages and disadvantages. We can say that the emphasis in the surveyed companies is on quality organization and compliance with rules and agreements. On the other hand, a smaller number of companies have a decentralized system, which is considered a more modern way of organization. A representation of the types of procurement systems by organization is shown in Figure 2.

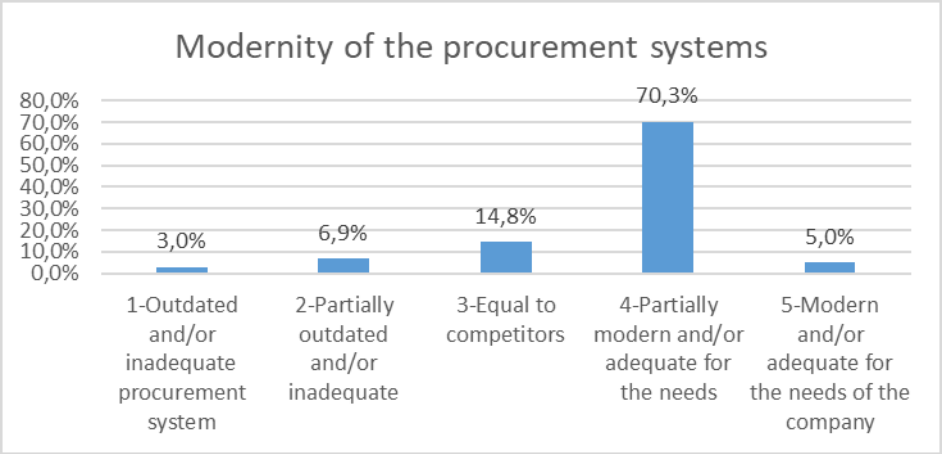
Figure 2. Representation of types of procurement systems



Source: Authors

Part of the competitiveness test also referred to the examination of the modernity of the procurement system, which was tested by a single statement to which the participants gave their assessments on a Likert-type scale of 1-5, where 1 means "outdated and/or inadequate procurement system" and 5 means "modern and/or adequate procurement system for the needs of society". The results are presented graphically using a histogram in Figure 3.

Figure 3. Modernity of the procurement systems of the surveyed companies



Source: Authors

In Figure 3, the majority of respondents consider their procurement system to be at least partially modern. Specifically, the largest share (70.3%) assesses their procurement system as "partially modern and/or adequate for the needs", while only 5% of respondents assess their system as fully modern and adequate for the needs of the company. Conversely, 3% of respondents consider their procurement system to be inadequate, while 6.9% state that it is partially outdated. Around 14.8% consider their system to be on par with their competitors. This data suggests that most companies recognize the need to modernize their procurement systems, although they rarely assess them to be fully optimal. Table 1. provides statistical analysis of communication with suppliers.

Table 1. Communication with suppliers

Contacts with suppliers/ customers are reduced to:	**Never**		**Rarely**		**Sometimes**		**Often**		**Always**		***Scale value***
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	
1. Classic offer and sale of our services.	1	1	4	4	24	23.8	45	45.5	26	25.7	3.91
2. Invitation to regular meetings related to current and future cooperation.	1	1	8	7.9	21	20.8	43	43.6	27	26.7	3.87
3. To find out what suppliers/customers expect from us.	1	1	4	4	27	26.7	55	55.4	13	12.9	3.75
4. Communication exclusively via e-mail.	3	3	3	3	25	24.8	58	58.3	11	10.9	3.71
5. Encouraging suppliers/ customers to comment, give ideas.	2	2	7	6.9	26	25.7	49	49.5	16	15.9	3.70

Contacts with suppliers/ customers are reduced to:	Never		Rarely		Sometimes		Often		Always		*Scale value*
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	
6. To interest them so that they decide to purchase the product as soon as possible.	2	2	6	5.9	26	25.7	53	53.5	13	12.9	3.69
7. To inform them about changes in business or the needs of the company.	2	2	8	7.9	30	30.7	39	38.6	21	20.8	3.68
8. Invitation to receptions and celebrations in the company.	2	2	13	12.9	26	25.7	49	49.5	10	9.9	3.52
9. Sending newsletters and other news related to the company to inform customers and suppliers.	8	7.9	9	8.9	24	24.7	44	43.6	15	14.9	3.49
10. Exchange of information about the way individual functions operate.	4	4	11	10.9	35	35.6	41	40.6	9	8.9	3.40

Source: Authors

The average assessment from participants regarding their communication with suppliers results in a score of 4 which corresponds to the frequency "often". Most contacts with suppliers/customers consistently include traditional service offers (M=3.91) and scheduled meetings about ongoing partnerships (M=3.87) according to over 70% of participants. The majority of participants report that their interactions with suppliers/customers depend entirely on email communication (M=3.71; 69.2% of participants) to determine what suppliers/customers expect from them (M=3.75; 68.3%). The feedback on additional statements shows elevated ratings while more than half of participants express agreement.

The analysis of collected data reveals multiple important trends regarding how often suppliers are contacted. Findings revealed that the traditional offer and sale of services remains the primary interaction method with 45.5% of respondents using it frequently and 26% employing it all the time. The research suggests that traditional approaches maintain their significance in business partnerships. Regular meetings occur frequently as 27% of respondents always hold them and 43.6% hold them frequently. Commercial partnerships benefit greatly from organized processes and effective interpersonal communication.

The practice of motivating suppliers to share their ideas remains crucial to business partnerships since 49.5% of respondents do this often and 15% maintain this practice regularly. The data demonstrates cooperative openness but points to opportunities for improvement in this field. Respondents who always inform suppliers and customers about business changes amount to 20%, whereas 38.6% do so on a frequent basis. There is a portion of responders who only occasionally or never inform partners about business changes which puts trust and business connections at risk. Forty-

three point six percent of the respondents distribute company newsletters and other related material frequently according to the survey data while fifteen percent do it consistently. These are particularly low numbers. The findings reveal opportunities for better business relations with partners were missed together with a deficient internal communication strategy. 40.6% of respondents exchange information about individual functions operation frequently and only 9% always participate in this exchange. The limited frequency of information exchange creates negative effects on coordination and process efficiency in business operations. The research reveals that traditional methods of communication remain prevalent although digital engagement continues to grow in popularity. Businesses can enhance supplier-consumer collaboration by strengthening proactive information sharing and two-way communication practices. Table 2. presents descriptive data about supplier communication.

Table 2. Descriptive data for communication with suppliers with regard to the size of the company

	N	**M**	**SD**
Small companies	34	3.56	0.672
Medium companies	35	3.69	0.594
Large companies	32	3.78	0.423
Total	101	3.67	0.577

Source: Authors

Table 2 presents the mean score (M) and standard deviation (SD) metrics which reflect communication frequencies between companies of different sizes and their suppliers. Analysis reveals large companies maintain the highest average communication score at 3.78 and medium-sized companies follow with a score of 3.69, whereas small companies demonstrate the lowest mean score at 3.56. The study's outcome demonstrates that larger organizations engage in more intensive supplier communication because their supply chains necessitate more complex and regular interactions. Small companies demonstrate the greatest response variability as indicated by a standard deviation of 0.672 meaning that their communication with suppliers ranges widely between intensive contact and minimal interaction. Large companies demonstrate the lowest variability in their processes with an SD of 0.423 which reflects their structured communication methods. The ANOVA analysis results displayed in Table 3 examine the communication differences with suppliers between companies of various sizes.

Table 3. Differences in communication with suppliers based on company size

	df	**F**	**p**
Between groups	2	1.256	0.29
Within groups	98		
Total	100		

Source: Authors

The ANOVA analysis results presented in Table 3 investigate the significance of communication frequency variations between suppliers and firms of varying sizes. The F value of 1.256 and p-value of 0.29 demonstrate no statistically significant differences between groups since p exceeds the conventional significance threshold of 0.05. Larger companies communicate with suppliers more often than smaller ones but this difference does not reach a level of statistical significance. The differences between groups are not significant. This finding can be explained by multiple factors. The standardization of communication processes across firms might explain why smaller firms work to sustain regular supplier interactions to protect their supply stability. The findings suggest different communication approaches are present between firm types with larger firms favoring established processes and meetings whereas smaller firms depend more on spontaneous communication methods and personal relationships which the measurement scale fails to properly document. The limited frequency of meetings and needs surveys among respondents suggests that many companies lack strategic supplier relationship management approaches. Modern supply chain operations demonstrate the importance of quality and timely communication because they support business continuity while reducing risk and optimizing costs.

Discussion.

A hierarchically structured procurement management system operates in 83.2% of companies while procurement remains centralized in 37.6% of companies or partially centralized in 47.6%. Decentralized systems exist in only 5.9% of cases but grant business units flexibility to meet specific requirements suggesting that research into decentralization's effect on procurement agility holds promise. The survey results reveal that 70.3% of participants view their procurement system as partially modern whereas 5% identify their system as entirely modern. Within the agricultural sector, centralized procurement systems dominate due to the need for cost control and coordination of input purchasing. The findings demonstrate that organizations recognize modernization requirements while they also prepare to implement advanced procurement systems through digital means and e-procurement. The research identifies supplier communication as a fundamental research dimension. Traditional sales and meetings (M=3.91) remain the most popular communication methods but e-mail communication (M=3.71) continues to gain importance. While digital channels bring efficiency advantages, the overuse of e-mail communication can negatively impact supplier relations and create challenges during negotiations and market competition. . The assessment of the modernity of procurement systems shows that the majority of respondents, 70.3%, assess their procurement systems as partially modern and/or appropriate to the needs of the company. Only 5.0% of respondents consider their procurement system to be completely modern and appropriate to the needs of the company, while 3.0% of respondents assess the system as outdated and/or inappropriate. An additional 6.9% of respondents consider the system to be partially outdated, while 14.8% of respondents assess the system to be at the level of the competition. These results point to the conclusion that most companies do not consider

their procurement systems to be completely outdated, but at the same time they do not assess them as completely modern either. In other words, there is significant room for further modernization of procurement processes. Results related to communication with suppliers show that traditional forms of business communication are the most common. The highest average rating is given to the classic offer and sale of services, with a value of M = 3.91, followed by invitations to regular meetings related to existing and future cooperation, with a value of M = 3.87. Although the results show that larger companies communicate with suppliers on average somewhat more frequently and in a more structured manner, the analysis of variance did not confirm statistically significant differences between companies of different sizes. The obtained value was F = 1.256, with p = 0.29, which means that the differences are not statistically significant. Therefore, it can be concluded that company size in itself is not a decisive factor in the intensity of communication with suppliers. Based on the results presented, it can be concluded that the procurement systems in the observed companies are predominantly focused on centralization, control and standardization of processes. Such a model can contribute to better cost control, compliance of procedures and more efficient management of suppliers, but at the same time it can limit flexibility and faster adaptation to the specific needs of individual business units. The low prevalence of fully decentralized models, of only 5.9%, confirms that companies in the agricultural sector still give greater priority to stability and control over organizational flexibility.

Conclusion

The research conducted on a sample of 101 respondents provided insight into the characteristics of procurement management systems and an assessment of the modernity of procurement processes in companies operating in the field of agricultural production and related agri-food supply chains. The results show that in the observed companies, hierarchically structured procurement quality management systems are most prevalent, used by 83.2% of the surveyed companies, while the quality management system through standardization, or ISO certification, is present in 72.3% of the companies. Full quality management is present in 44.6% of the companies, while more modern and continuous development approaches, such as the Kaizen system, are present to a significantly lesser extent, or only in 5.0% of the surveyed companies. The research results confirm the pronounced dominance of centralized and partially centralized procurement systems. A fully centralized procurement system is used by 37.6% of the companies, while a partially centralized system is present in 47.6% of the companies. Taken together, centralized and partially centralized models make up 85.2% of the total sample. In contrast, partially decentralized systems are present in 8.9% of companies, and fully decentralized systems in only 5.9% of companies. This confirms hypothesis H1, according to which centralized procurement systems are more dominant than decentralized models. The research also shows that the modernization of procurement is not equally expressed in all observed aspects. On the one hand, most companies do not perceive their systems as outdated, which is confirmed by the fact that only 3.0% of respondents rate the system. The research has certain limitations that should be

considered when interpreting the results. The study was conducted on a sample of 101 respondents, which limits the possibility of generalizing the findings to all companies operating in the agricultural sector. In addition, the results are based on respondents' subjective assessments, especially regarding the perceived modernity of procurement systems, while objective indicators of digitalization, automation and financial effects of procurement modernization were not examined in detail.

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Conflict of interests

The authors declare no conflict of interest.

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