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## Establishment of competition in the market of seed and planting material certification services in Ukraine

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► **Abstract.** The quality and varietal purity of seeds is one of the crucial factors in determining the consumer value of any end product. Sowing with high-quality seeds ensures a successful harvest in the future. The purpose of this study was to determine the state (formation and development) of competition in the market for certification of plant variety seeds. The main methods used in the study are statistical analysis, comprehensive assessment, deduction, abstraction, forecasting, historical, and tabular methods. This study investigated the state of competition of subjects of appraisal activity by six objective indicators, analysed their material and technical base, and human potential. The market for seed certification services is a market with limited access and should be characterised as an oligopoly. This market is represented by entities of different forms of ownership and management, it is competitive in determining seed quality and virtually monopolistic in determining varietal properties. Fluctuations in the cost of services are insignificant (15%) and are not currently the main criterion for seed producers when choosing an organisation that conducts seed certification. The present paper was the first to determine the total market capacity in terms of volume and value, and to present possible ways of its growth, which is the practical value of this study. The data presented in this study can be used by other researchers in their scientific work related to this market or agriculture. The findings may also be required by government officials or businesses operating in the market

► **Keywords:** subjects of seed production; public administration; agriculture; varietal and sowing qualities; entrepreneurship

### ► Introduction

According to Article 15 of the Law of Ukraine No. 411-IV "On Seeds and Planting Material" (2002), as a commodity, seeds are only allowed to enter the market if they have two certificates certifying their varietal and sowing qualities. The right to issue documents is vested in conformity assessment bodies: enterprises, institutions, organisations accredited by the national accreditation body of Ukraine and authorised by the relevant central executive body to carry out conformity assessment activities in the field of

seed production (Vinyukova, 2023). Such services are paid for by seed producers, and their cost is included in the cost of seed production, selling price, and ultimately affects the competitiveness of seeds (Shubalyi *et al.*, 2020; Bazaluk *et al.*, 2021).

There are many articles in the scientific literature on scientific approaches, principles, objectives, and the role of plant variety seed certification in Ukraine, etc. It was decided to focus only on those issues that mainly relate

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to the problems of establishing a market for plant variety seed certification services. S. Volodin (2021) proposed the introduction of a digital platform to support the seed production (nursery) system, which could provide expertise on a cluster basis of public-private partnerships, which would increase the quality control of seeds and planting material, improve conformity assessment and certification of products using a consolidated laboratory base. O. Zakharchuk *et al.* (2023) also assessed the current state and prospects of the certified seed market in Ukraine in their study. They described the role of this component, defining it as crucial for food security. The researchers also addressed the existing challenges in finding new opportunities to improve the quality of seeds on the Ukrainian market, as well as the possibility of introducing protectionist measures for the same purpose. Special attention should also be paid to the study by O. Skydan *et al.* (2023). They pointed out the considerable negative impact of the war on Ukraine's agricultural sector and the entire economy. The researchers also proposed some methods of solving the existing problems, but they were described rather superficially, which does not allow them to be used immediately to improve the situation. N. Honcharenko (2022) assessed the existing opportunities to improve the certification procedure for organic production in Ukraine. The scientist noted the role of this component for the development of the country, its application within the framework of international practice, and offered some advice for the future improvement of the market functioning. K. Mazur & O. Zakharchuk (2020) described the existing problems in the commercialisation of the seed market in Ukraine, noting the need to consider the practices of other countries to improve the efficiency of its functioning. The researchers provided a list of public policy areas that could be implemented, although they did so rather superficially.

The purpose of this study was to investigate the specific features of development of the domestic seed certification market in Ukraine, considering its current development trends, and the objectives were to determine the current state and specific features of formation and development of competition in the seed certification market in Ukraine, to clarify the principles of competition in this market; to investigate the capacity and structure of the seed certification market; the impact of competition on the quality and price of services provided by conformity assessment bodies.

### ► Materials and Methods

The information base of the study included data from the Registers of certificates for varietal and sowing qualities of seeds (Registry of seed and/or..., 2023), information from agricultural producers who used the services of seed and planting material certification bodies. The calculations were carried out in MS Excel using statistical research methods. The study analysed the subject composition of conformity assessment bodies in the field of seed production operating in Ukraine, assessing the size of their authorized capital, form of ownership and start of activity; specific features of their activity according to the selected six criteria (number of regions where the conformity assessment body provides services (1), number of seed producers using the services (2), number of crops for which

the services are provided (3), number of certificates for sowing quality (4), the total volume of certified grain seeds (5), the number of countries whose seeds are certified (6)); data on the analysis of competitiveness and market capacity in the market for seed sowing quality certification services and the market for seed varietal quality determination services; data on the analysis of the structure of the market for seed and planting material certification services by conformity assessment bodies and types of certification. Furthermore, the legal framework of Ukraine in the field of seed production was investigated, namely, the Law of Ukraine No. 411-IV "On Seeds and Planting Material" (2002), as well as the Law of Ukraine No. 2763-IX "On Amendments to Certain Legislative Acts of Ukraine on Bringing Legislation in the Field of Protection of Rights to Plant Varieties and Seeds and Nurseries into Compliance with the Provisions of European Union Legislation" (2022).

To characterise the market form by the number of participants, the scheme for determining market forms was used and the seed certification services market was classified as an oligopoly with many consumers (452) and several (5) service providers (Aziz *et al.*, 2023). This market is a restricted market, as service providers need to be accredited by the national authority of Ukraine and obtain the authority to carry out conformity assessment activities in the field of seed production, and customers need to be included in the Register of seed and planting material certificates (Registry of seed and planting material certificates, 2023).

The study was based on a systematic approach, which made it possible to combine various aspects of competition in the market of the services under study. The main method used in the study was analysis, which helped to draw the main conclusions of the study based on qualitative and quantitative data available in open sources. The importance of the historical method of research is conditioned by the need to clarify the preconditions for market liberalisation measures in this market. The deduction method helped to explore possible factors influencing the development of competition. The abstraction helped to eliminate factors that had a relatively minor impact on the development of competition in the seed certification market in Ukraine, and thus improve the quality of the model. Forecasting helped to assess the future prospects for the development of this market in the current environment, especially with regard to the war in the country. The statistical method of information processing helped to work on quantitative data characterising competition in the seed certification market.

### ► Results

In 2022, five business entities provided seed certification services in Ukraine, one of which was state-owned and four were private. Thus, it can be argued that in Ukraine, since 2020, there has been competition in the seed certification market. This is conditioned by the fact that there are at least five such structures. State Enterprise (SE) "State Centre for Certification and Expertise of Agricultural Products" was established in 2014, is the successor of the State Seed Inspectorate, which provided services for determining the sowing qualities of seeds for more than fifty years, its branches worked in all district centres, conducting a comprehensive analysis of all seeds sown on Ukrainian

fields, the other four institutions are privately owned and established as limited liability companies during 2016-2019 (Official website of the State Enterprise..., n.d.).

Legislatively, the right to conduct varietal control of the “pre-basic and basic seeds” categories belonged exclusively to the State Enterprise “State Centre for Certification and Expertise of Agricultural Products”, i.e., competition was possible only in the market for varietal control of certified seeds. Full competition is present in the market of seed quality assessment services, as all five conformity assessment bodies are entitled to provide services and issue certificates certifying seed quality. On 10.06.2023,

the Law of Ukraine No. 2763-IX dated 16.11.2022 (Law of Ukraine..., 2022) came into force, which lifted restrictions on monopoly actions of the State Enterprise “State Centre for Certification and Examination of Agricultural Products” in relation to varietal seed control of seeds of the additional and basic categories.

The level of competition in the market of seed quality assessment services can be described in Table 1. Data for 2022 was used for the analysis. The SE “State Centre for Certification and Examination of Agricultural Products” is currently the most competitive player in the market by all indicators presented in Table 1.

**Table 1.** Characteristics of the activities of conformity assessment bodies by key parameters in 2022

	Conformity assessment body	Number of regions in which the conformity assessment body provides services	Number of subjects seed producers using the services	Number of crops for which services were provided	Number of certificates issued for sowing quality	Total volume of certified grain seeds, thousand tonnes	Number of countries of origin whose seeds are certified
1	State Enterprise “State Centre for Certification and Expertise of Agricultural Products”	24	361	109	14,560	91.15	37
2	AGROCERT LLC	20	88	60	7,416	7.48	36
3	AGROLABTEST LLC	2	6	10	942	0.88	13
4	NOVACERT LLC	6	8	7	211	0.42	8
5	VELES-SEEDS LLC	7	19	19	851	8.04	17
	<b>Total</b>	24	452	121	23,980	107.97	47

**Note:** to avoid double counting, the real value is presented here, not the sum

**Source:** compiled by the authors of this study based on the Registry of seed and/or planting material certificates (2023)

AGROLABTEST LLC focuses on certification of seeds of varieties, hybrids, and parental components of foreign selection, mainly sunflower and maize, and serves a small number of seed producers, including Limagrain Ukraine LLC, G & Seeds LLC, Agral Agro LLC (Registry of seed and/or..., 2023). In the two years of its presence on the market, it has not expanded the base of service providers. This entity is created to serve concretely identified customers. VELES-SEEDS LLC and NOVACERT LLC started operations only in mid-2021, and therefore it is too early to discuss their impact on the market. One of the main actors in the seed certification market is AGROCERT LLC: it works with every fifth seed producer, operates in almost all regions, and the volume of grain seeds that have received quality certificates is 7.9% of the total amount (Registry of seed and/or..., 2023). As Table 1 suggests, the demand for seed certification services in 2022 was formed by 452 seed producers, including 414 seed producers, and the remaining 38 seed distributors.

The cost of certification services in the field of seed production by state-owned conformity assessment bodies is determined following the legislation and according

to the approved rates. Payment for services provided by private conformity assessment bodies is made according to contracts. The study of the cost of certification of sowing qualities of seeds of spiked cereals as of January 2022 (the deadline for updating information on official state sources) found that the cost of this service at the State Enterprise “State Centre for Certification and Expertise of Agricultural Products” is the highest – UAH 1,578.60 per batch of seeds weighing no more than 25 tonnes, and the cost does not depend on the batch size. The analysis of the costing of services was possible only for the state-owned enterprise (Table 2). This relates to the fact that the State Centre for Certification and Expertise of Agricultural Products is the largest, and therefore information on it is available on the Internet, while other companies are not. This calculation raises many questions about the cost of individual works, specifically, the amount of profit is not separated out, but is found in the value of concrete works. The largest share is accounted for by the costs of registration and issuing certificates (almost 25%). It can be assumed that the calculation includes sending one copy of the certificates to consumers, seed producers, by Nova Post with targeted delivery.

**Table 2.** Calculation of the cost of the service for determining the sowing qualities of seeds of cereal crops in the State Enterprise “State Centre for Certification and Expertise of Agricultural Products” as of January 2022

Service	Cost, UAH	%
1. Sampling and labelling of the seed lot	234.00	14.8
2. Filling in the work log	42.80	2.7

Table 2, Continued

Service	Cost, UAH	%
3. Taking an average sample of the weights	42.80	2.7
4. Analysis of purity weights	129.60	8.2
5. Determination of the thousand-kernel-weight	158.00	10.0
6. Determination of seed moisture content	144.00	9.1
7. Determination of pest infestation	48.60	3.2
8. Preparation of thermostats, bedding, filter paper, sowing seeds	68.00	4.3
9. Determination of seed germination energy	68.00	4.3
10. Determining seed germination	52.00	3.3
11. Analysis of the sample residue for the presence of cultural impurities, quarantine objects, difficult to separate weeds	135.60	8.6
12. Drafting the results (test report)	62.40	3.9
13. Registration and issuance of the certificate	392.80	24.9
<b>Cost of 1 service for seed certification for sowing quality</b>	<b>1,578.60</b>	<b>100.0</b>

Source: calculated by the authors of this study based on data from the Registry of seed and/or planting material certificates (2023)

To analyse the competitiveness of conformity assessment bodies in terms of the availability of material and technical facilities and qualified personnel, data from the Register of Conformity Assessment Bodies (Registry of seed and/or..., 2023) were used. The highest indicator is in the State Enterprise "State Centre for Certification and Examination of Agricultural Products": accredited laboratories in Kyiv and 11 regional centres, total number of qualified staff – 184 people. AGROCERT LLC has a testing laboratory in Dnipro and two departments in Kyiv and Poltava. Furthermore, it has concluded cooperation agreements with 6 legal entities that have an accreditation certificate and employs 49 specialists. The other conformity assessment bodies own only one accredited laboratory with the number of specialists from 7 to 10 people and have concluded agreements with testing laboratories: 2 agreements with AGROLABTEST LLC and 3 agreements with WELLS-SEEDS LLC and NOVACERT LLC. The powerful material and technical base and the availability of a sizeable number of staff of the SE "State Centre for Certification and Expertise of Agricultural Products" is the main competitive advantage of this institution in terms of geographical coverage of seed producers and the possibility of establishing their close

cooperation. Therewith, this indicator has a substantial impact on the growth of service prices. The minimal number of in-house laboratories and staff of the three latter conformity assessment bodies will not allow them to substantially expand their services and create serious competition in the market for seed certification of plant varieties.

An analysis of the impact of military operations on competition showed that the total market for seed certification services for sowing quality considerably decreased: in physical terms, it fell by 29%, or the number of certificates issued was 9,697. The largest reductions in service provision were made by the SE "State Centre for Certification and Expertise of Agricultural Products" – 6,186 services (30%), and AGROCERT LLC – 4,149 services (36%). VELES-SEEDS LLC increased its services, with a 284% growth; the territory where this company operates was not in the combat zone, the company is just entering the market, is mobile, rake part in tender procurement, and has a flexible system of service costs. The company's overall market share is only 3%, but 2022 was a year of significant growth in service provision. Data on the level of competition and the capacity of the seed certification market is presented in Table 3.

Table 3. Level of specificity and capacity of the seed certification services market in 2022

	Conformity assessment body	Rating	Market for seed quality certification services			Market for seed varietal quality determination services	
			Number of certificates issued, pieces	Cost of 1 certificate, UAH	Total cost, thousand UAH	Number of certificates issued, pieces	Total cost, thousand UAH
1	State Enterprise "State Centre for Certification and Expertise of Agricultural Products"	IV	14,560	1,578.60	22,984.4	5,997	11,550
2	AGROCERT LLC	II	7,416	1,380.00	10,234.1		
3	AGROLABTEST LLC	I	942	1,270.80	1,197.1		
4	NOVACERT LLC	II	211	1,380.00	291.2		
5	VELES-SEEDS LLC	III	851	1,340.40	1,140.7		
	Total		<b>23,980</b>		<b>35,847.5</b>	<b>5,997</b>	<b>11,550</b>

Source: calculated by the authors of this study based on data from the Registry of seed and/or planting material certificates (2023)

The most competitive price is the cost of the service provided by AGROLABTEST LLC – UAH 1,270.80, or UAH 307.80 less, AGROLABTEST LLC – UAH 1,270.80, NOVACERT LLC – UAH 1,380, and VELES-SEEDS LLC – UAH 1,340.40. The State Centre for Certification and Expertise of Agricultural Products has a fixed price and does not take part in open tenders for work. They are announced by budgetary institutions. AGROLABTEST LLC and VELES-SEEDS LLC take part in tenders and receive significant price discounts for large order volumes. The total current capacity of the services market (calculated through demand) in 2022 was UAH 47.4 million, including certification of seed quality – UAH 35.8 million and varietal quality – UAH 11.55 million, or 75% and 25%, respectively. Thus, SE “State Centre for Certification and Expertise of Agricultural Products” is a monopolist in the market of varietal properties determination services and has a 64.4% share in the market of sowing qualities determination, AGROCERT LLC – 28.5%, the other three conformity assessment bodies have 7.1% of the market. Such data is generally negative for the market, given that a market monopoly generally leads to a lack of competition and, consequently, to its less efficient functioning. Therefore, the government’s goal should be to increase the role of private enterprises in the market to improve the situation in terms of competition.

### ► Discussion

M.K. Misra *et al.* (2023) thoroughly covered the role of seed certification in ensuring product quality, noting that seed certification is a process that ensures the preservation of the genetic identity and purity of plant varieties during seed production and propagation, and is based on regulatory standards and procedures applied at different stages of seed production. Therewith, seeds labelled as “certified” meet the specified quality standards, which is confirmed by a certificate issued by the state conformity assessment body. Such certificates should be issued fairly and without unnecessary complications, so as not to create obstacles to the economic development of farmers. According to the scientists, in the US, seed certification was established by the US Federal Seed Act of 1940, and standards were added in 1969 by the Association of Official Seed Certification Agencies (AOSCA) (Federal Seed Act, 1940); the local Federal Seed Act regulates the transportation of seeds between states and requires truthful labelling, and seed companies use national certification standards following this law. In European countries, varieties must be listed in the official catalogue with completed test results for distinctiveness, uniformity, and stability, and value for cultivation and use. In other words, in these countries, the certification process is essential at the state level: it receives a lot of attention from both policy makers and scientists (Loizou *et al.*, 2019). In terms of who plays the main role in the certification process, it is worth noting that in the US it is companies, while in Europe the state plays a relatively higher role. In Ukraine, as noted above, the role of the state institution is more important, and this is a significant difference from highly developed countries. It should be assumed that to ensure a more efficient functioning of the seed certification market, the government should aim to increase competition in the market, specifically by reducing its presence: although it may indeed provide

more efficient conditions for companies (considering the economic situation in the country, including the war), this process has its drawbacks, which are particularly evident in the long run (Proskurnina, 2019).

A. Nandi *et al.* (2022) assessed the role of seed certification and re-testing and the development of new varieties and crops in the context of climate change. Scientists have emphasised the need to assess the viability of crop seeds in different locations to ensure their quality and optimal plant health. The current expiry dates were determined based on current climate conditions, but due to rapid climate change, it is likely that other standards will need to be introduced. They also addressed the importance of proper seed storage and avoiding specific conditions of relative humidity and temperature.

U. Joshi & R. Singh (2020) also assessed the features of seed certification. They described seed certification as a vital process in seed production, ensuring that farmers have access to high quality seed to achieve high yields. They conducted their research based on data from India, where the law on this procedure was adopted in 1966 and makes provision for management checks, field examinations, mass inspections, and testing of control plots, which is the key to a prominent level of seed purity and health. Ukrainian seed quality testing companies should pay attention to the procedures carried out and described in the study, so that they can use them in the future within the framework of their own inspections.

M.A. Indrianti *et al.* (2021) described the rice seed certification process at the Seed Certification Supervision Centre in Gorontalo Province, Indonesia. The scientists noted that this process involves several stages: application, authentication of the source, inspection of the field and sowing conditions, isolation of plants and harvesting tools, seed sampling, laboratory quality tests and, finally, issuance of certificates and labels for food plant seeds. However, there are cases of refusal to issue a certificate if the seeds have a high moisture content or poor physical condition. This was also mentioned by P. Schreinemachers *et al.* (2021). This confirms the importance of strict quality control in the certification process to ensure that farmers receive high-quality rice seeds for sowing and further food production, which should be relevant for Ukraine as well.

M. Baglan *et al.* (2020) assessed the role of seed certification implementation using data from Kazakhstan. The scientists noted that ensuring food security is a key component for developing countries, specifically for those characterised by a transitional phase of economic development, which is the case in Ukraine. They believe that the introduction of seed certification will go a long way towards ensuring the production of high-quality products in the country. According to their data, farmers who use certified seeds are 10.3% more efficient, and to motivate them to do so, scientists recommend implementing policies aimed at improving education, providing easier access to credit and empowering farmers to increase their incomes, which was also mentioned by K. Kuhlmann & B. Dey (2021) and S.I. Hlatshwayo *et al.* (2021). In general, all the information received should be relevant for Ukraine, considering certain common features of development with Kazakhstan. By intensifying the seed certification process, the quality of products is improved. However, the implementation of

a clear policy in this area is complicated by the fact that the country is at war, when all efforts are aimed at protecting the territorial integrity and ensuring the stable functioning of the economy and social sphere.

Thus, the situation with seed certification in the domestic market of Ukraine has its own specific features: the existing but low level of competition, its significant monopolisation, the adverse impact of the war, etc. However, to improve the situation, the state could introduce monitoring of the market situation, including competition. Changes in the level of competition in the market should be assessed, and in case of deterioration (increased influence of state institutions), appropriate regulatory actions should be taken. The growth of private seed certification bodies should be promoted to increase competition and provide farmers with more opportunities. It is also important to prevent conflicts between representatives of agricultural enterprises and conformity assessment bodies. This government policy will considerably increase the efficiency of the seed certification market in Ukraine.

### ► Conclusions

If the quality of service delivery is equal, the competitiveness rating of an institution determines the level of service price: the lowest price is the highest rating and vice versa. As of 2022, AGROLABTEST LLC ranked first, followed by AGROCERT LLC and NOVACERT LLC; VELES-SEEDS LLC ranked third, and the SE "State Centre for Certification and Expertise of Agricultural Products" took the fourth place. The market for seed and planting material certification services is a restricted market. In terms of the number of participants, it should be characterised as an oligopoly. The market for seed certification services is competitive in terms of determining sowing and virtually monopolistic in terms of determining varietal properties, as stipulated by legislation. This market is represented by entities of

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various forms of ownership and business. New conformity assessment bodies are entering the market, having managed to increase their share of the market during the war. The total market capacity exceeded UAH 47 million, the majority of which (75%) is accounted for by the certification of sowing qualities, and the rest (25%) – by the determination of varietal properties. The market has every reason to grow, as the share of certified cereal seeds ranges from 10-20%, and fruit and vegetable seeds are even lower.

Thus, the seed certification market in Ukraine has undergone considerable transformations, shifting from a monopolistic to a competitive environment. While the state-owned centre is still influential, private entities are making inroads by offering competitive prices and expanding their operations. The market's response to the challenges posed by the outbreak of war underlines its resilience and adaptability. The future development of this market will depend on regulatory changes and the evolution of the competitive environment. The scientific originality of this study is a comprehensive characterisation of conformity assessment bodies from the standpoint of competition in the market, identification of their strengths and weaknesses, and rating of the institutions' competitiveness in terms of the price of services. This study is the first to calculate the real capacity of the market of services and determine its structure, and it is promising for future research to continue assessing the dynamics of the market of seed certification services and analysing its individual representatives. Furthermore, it is key to assess the role of the state in the market and take steps to reduce its presence in the market.

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### ► Conflict of Interest

The authors of this study declare no conflict of interest.

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## Становлення конкуренції на ринку послуг з сертифікації насіння та садивного матеріалу в Україні

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► **Анотація.** Якість і сортова чистота насіння є одним з найважливіших факторів при формуванні споживчої вартості будь-якого кінцевого продукту. Посів високоякісним насінням забезпечує успішний збір великого врожаю у майбутньому. Метою дослідження було визначити стан (становлення та розвиток) конкуренції на ринку послуг з сертифікації насіння рослин. Основні методи, використані під час роботи – це статистичний аналіз, комплексна оцінка, метод дедукції, абстрагування, прогнозування, історичний та табличний методи. В рамках даної роботи досліджено стан конкуренції суб'єктів оціночної діяльності за шістьма об'єктивними показниками, проведено аналіз їх матеріально-технічної бази та кадрового потенціалу. Ринок послуг із сертифікації насіння відноситься до ринків з обмеженим доступом і його слід характеризувати як олігополію. На даному ринку присутні суб'єкти різних форм власності та господарювання, він є конкурентним із визначення посівних якостей насіння та фактично монополієм при визначенні сортових властивостей. Коливання вартості послуг є незначним (15 %) та фактично на даний момент не є основним критерієм для суб'єктів насінництва при виборі організації, що проводить сертифікацію насіння. Вперше визначено загальну ємність ринку в натуральних та вартісних показниках, показано можливі шляхи його зростання, що становить практичну цінність даної роботи. Дані, наведені в рамках дослідження, можуть бути використані іншими вченими для написання власних робіт, пов'язаних із даним ринком чи сільським господарством. Вони також можуть знадобитися представникам державної влади чи власне підприємствам, що діють на даному ринку

► **Ключові слова:** суб'єкти насінництва; державне управління; сільське господарство; сортові та посівні якості; підприємництво