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Taxonomy and Stakeholder Risk Management in Integrated Projects of the European Green Deal

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Abstract: The article analyzed the state of the global problem of ecological safety of the EU and argued the need to create a methodology for planning technologically integrated projects of the "European Green Deal" (TIP "EGD") that accounts for the risks to the stakeholders, i.e., the state, project executors, resource suppliers, project managers, and clients. Each of these has an individual set of values that determines the project risk for them. Herein is proposed a taxonomy of three ranks of TIP "EGD" involving agricultural waste, determined by their characteristics, products, and requirements for the stakeholders. The authors point out the need to create tools for quantitative risk assessment for the stakeholders of TIP "EGD" involving agricultural waste and distinguish four group. of risk components with regard to the value of such projects. A model of value risk formation is presented that addresses the risk management of each of these stakeholder values. The need to develop tools (models, methods, and algorithms) for quantitative risk assessment of the values of each typ. of project is discussed. Regularities in the formation of stakeholder values, which were a foundation of the model of formation, are established.

Keywords: integrated projects; European Green Deal; risks; value; stakeholders

1. Introduction

The existing global problem in environmental security in the EU is multifaceted and concerns both the production of various types of raw materials and the creation of environmentally friendly products and services. At the same time, EU policy on climate, energy, transport, and taxation, which is reflected in regulations [1–3], aims to reduce greenhouse gas emissions by at least 55% by 2030 compared with those in 1990. The authors of [4] argued that the European Green Deal is the most ambitious and challenging goal set by the European Commission. At the same time, the authors of [5–9] argued for the feasibility of implementing projects for the use of agricultural raw materials as components of the European Green Deal. This would provide an opportunity to achieve the declared goals in the European Green Deal by 2050.

One of the most important components of this problem is the provision of normalized greenhouse gas (GHG) emissions during activities in various fields. This leads to the strengthening of EU requirements for both the technologies used and the quality of raw materials from which the final product is obtained. This encourages producers of the final product to join forces by launching interdependent integrated projects [10,11]. This allows them to provide the necessary resources (production facilities, machinery and equipment, contractors, etc.), which significantly increases the quality of the final product and allows using modern, environmentally friendly technologies. Therefore, the value of such projects for investors increases accordingly.

At the same time, there is no methodology for implementing technologically integrated projects of the "European Green Deal" that would take into account the peculiarities of risk assessment for their investors. Particular attention should be paid to integrated projects that involve the use of agricultural waste as a raw material for the production of clean energy. Such projects have their own specifics and features of implementation [12–15]. The risks to their investors largely depend on the changing components of the project environment and the selected typ. and technology of agricultural waste collection. The basic projects that are systematically interconnected with other projects involve collection of agricultural waste. They ensure delivery of the finished product to end users.

One of the tasks in creating a methodology for the implementation of projects taking into account the risks to investors is the taxonomy of risks. This is based on the principles and methods of classification of components of these projects, which are determined by the structure of complex hierarchical systems.

2. Analysis of Literature Data and Problem Statement

At the end of 2019, the European Commission presented a large-scale program, the European Green Deal, which envisaged the transformation of the EU into a carbon-neutral continent by 2050 [3]. In particular, it was declared that by 2030, the implementation of the program would reduce GHG emissions in the EU by 50–55% compared with those in 1990, and that by 2050, the EU would achieve full climate neutrality. The main component of this program is the development of effective tools for decarbonization of the economy of both the EU's member states and its economic partners. The latter countries include Ukraine, which is a supplier of resources for environmentally friendly power and food.

Analysis of literature showed that some sources have discussed the implementation of technologically integrated projects in various contexts. In particular, in [16,17] a method was developed that could be partially used in projects related to purchasing of raw materials for the production of clean energy, and the value of agricultural projects was assessed with this method. In [18], the expediency of hydrogen gas production was substantiated, as were the main factors influencing its production. These factors could be used in part to study the project environment in the European Green Deal projects. In [19,20], the authors proved the significant impact of the territorial location of raw materials relative to the points of their processing on the value of agricultural production projects. The approach proposed in [21] for the production of raw materials for fuel, as well as the dynamic model presented in [22], ensure that certain components of the design environment are taken into account. These works were important achievements that can be used as tools for managing technologically integrated projects. However, there have been no publications on the investment risks in TIP "EGD", neither on their taxonomy.

Projects concerning the production of clean energy from agricultural raw materials require significant investment. Regarding risk management in projects, some international standards and tools have been developed that take specifics into account [23–27]. However, they do not account for systemic interproject links or the specifics of the project environment.

Additionally, there is currently no sound taxonomy for assessing the investor risks in TIP "EGD" involving agricultural waste.

The analysis of well-known scientific articles, offering approaches and tools for risk management and investor benefits (value) of projects in certain subject areas, and in particular of certain types of projects, shows the importance of project activities for theory and practice. In particular, the authors of [28,29] substantiated the feasibility of a design approach to project management of biofuel raw materials. They also proposed a method that, unlike others, involved predicting the variable life cycle periods of biofuel feedstock projects. Another noteworthy work is [30], which presented the results of a study on five models of the agricultural market on the Chicago Mercantile Exchange in the years 1975–2010 in terms of competition with the agricultural market of the European Union. Ref. [31] proposed an approach that involved a hierarchical decomposition of risks by introducing two categories of risk assessment: the final risk, which corresponds to losses due to uncertainty of the outcome of decisions, and current risk, which corresponds to deviations from the planned regulatory values. Ref. [32] proposed a method of assessing financial risks based on the modeling of financial flows, which is the foundation for forecasting premiums and revenues for insurance companies. Refs. [32–37] proved that business improvement and efficiency of project processes in various areas could be achieved by managing risk, cost, uncertainty, and requirements in the early stages of the project. Ref. [30] proposed singling out certain factors that determine the project risk.

However, sources [28–37] only partially discussed the implementation of TIP "EGD" and the taxonomy of risks for their investors and cannot be used because of a number of shortcomings. In particular, the expediency of assessing the value of stakeholder risk in integrated clean energy production projects was not substantiated, which renders the aforementioned sources immaterial. Failure to consider the investors' risk affects the product quality (production of environmentally friendly products or services) and effectiveness of these technologically integrated projects. Refs. [36,37] proved the practicality of coordination of the product configuration of system development projects with their design and environment. According to the authors, this underlay the effective implementation of integrated projects. The same approach was used by the authors of [36], who studied the variable natural potential of wind energy in the northern strip of the Ukrainian Carpathians. Based on the above approach, in [38,39], a risk assessment model for investors in biofuel production projects was developed. Moreover, in [40,41], it was proved that creation of value from the implementation of any project is impossible without risk management and introduction of control processes with regard to time and resources. The authors of [38] used this approach for implementation of agricultural projects aimed at obtaining raw materials for hydrogen production.

Important to the perspective of integrated project management is the methodology in [42–47], which contained the general approaches and processes as well as development programs for organizations. This methodology stipulates that the implementation of projects provides value for their stakeholders, and it offers general principles for managing the value of projects that do not take into account the features of TIP "EGD". Therefore, it cannot be fully used to manage such projects and the taxonomy of risks for their investors. For example, projects aiming to provide agricultural raw materials and create environmentally friendly products or services that are technologically integrated and systematically implemented in a separate area differ from other types of projects in terms of structure and features of stakeholder value formation. Additionally, they have a specific design environment, which is a variable and the main source of risk. All of the above constitutes the foundation for the definition of taxonomic ranks used to classify the risks to investors in integrated projects using agricultural waste.

For the quality management of value and risks to investors of TIP "EGD", it is necessary to perform a taxonomy of the risks to said investors [48–51], as there are systemic relationship. among them that need to be revealed. It is also necessary to devise taxonomic models that underlie investor risk and value. In particular, the relationship. between the components of the values for investors of these projects and the peculiarities of their formation, as well as the risks, must be taken into account.

Based on the above, the authors formulated the purpose and objectives of the study.

The purpose of the work was to substantiate the peculiarities of the implementation of TIP "EGD" involving agricultural waste and taxonomic models of investor risks.

To achieve this objective, the following tasks were completed:

- offering a taxonomy of projects involving agricultural waste and features of their implementation;
- substantiating the components and model of stakeholder risk value formation in projects;
- establishing the affiliation of the stakeholder value of grain waste procurement projects and performing a quantitative assessment of their risks.

3. Taxonomy of TIP "EGD" Involving Agricultural Waste and the Model of Stakeholder Risk Formation

In order to obtain a final and desired product for consumers, a number of step. must first be undertaken to create it. In the European Green Deal projects, consumed clean energy is the final product. To obtain this product, a number of systems that perform specific actions are applied. Such systems include the production of environmentally friendly raw materials, their acquisition and processing, and production and consumption of environmentally friendly energy. Each of these systems implements its own specific projects, which are integrated with their products. However, implementation of technologically integrated projects requires systematic consideration and management. Their taxonomy is a priority for effective identification and further management of projects. The taxonomy of technologically integrated systems requires the application of novel principles and methods of classification of the components of these projects. It must be determined by the structure of complex hierarchical systems of "waste"—"raw materials"—"environmentally friendly energy"—"consumption of environmental energy"—"production of environmentally friendly products or services". The presence of many systems, as well as the interactions among them, leads to synergies related to benefits for investors in technologically integrated projects. It is the presence of synergies and potential benefits arising from the implementation of technologically integrated projects of the "European Green Deal" that underlies the hierarchization of investors' risks in these projects. Therefore, in the current paper, we use the following concepts. Technologically integrated projects of the "European Green Deal" refer to a set of technologically interconnected projects related to the creation and development of complex hierarchical systems. The taxonomy of technologically integrated European Green Deal projects is a source of knowledge on the principles of initiating projects of complex hierarchical systems of "waste"—"raw materials"—"clean energy"—"green energy consumption"—"production of clean products or services" as well as on the methods of classifying and structuring such projects while taking into account cross-system interactions, which are determined by the characteristics of the environment of each project.

The taxonomy of TIP "EGD" involves the knowledge on the principles of project initiation in complex hierarchical systems according to the sequence above, and also ways of their classification and structuring, taking into account cross-system communication which is enforced by the features of the specified systems and their design environment.

Based on the analysis of a number of measures related to TIP "EGD" technologies and their effective use in the EU, it can be argued that the decarbonization of the economy cannot be ensured by considering only the energy sector. To do this, technologically integrated systems should be considered that form the raw material base as well as the final product, which is obtained in the use of "clean" energy. This indicates that the implementation of individual TIP "EGD" involving agricultural waste is inefficient without considering the system cycle, which is presented in Figure 1.

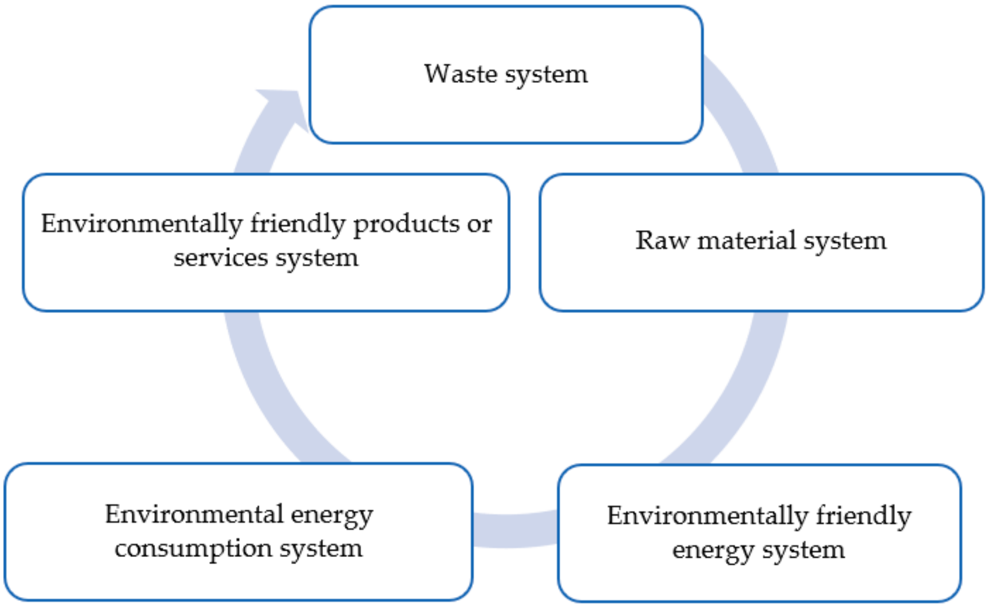

Figure 1. The structure of systems that ensure the implementation of TIP "EGD" involving agricultural waste.

All of the above indicates the need to implement integrated projects using agricultural waste for raw materials based on the aforementioned system cycle to provide the desired value for stakeholders, including investors.

Each of the systems depicted in Figure 1 includes the implementation of a number of projects. The value of projects involving agricultural waste refers to the benefits that stakeholders obtain from the products of these projects, which include (Figure 2):

- obtained waste—for agricultural waste procurement projects;
- obtained raw materials—for projects involving transportation and preparation of environmentally friendly raw materials for energy;
- stored raw materials—for projects involving the storage of environmentally friendly raw materials for energy purposes;
- marketable raw materials—for projects involving the sale of environmentally friendly raw materials for energy purposes;
- obtained "clean" energy—for projects involving ecological power production;
- production and supply of "clean" energy—for projects involving the consumption of ecological power.

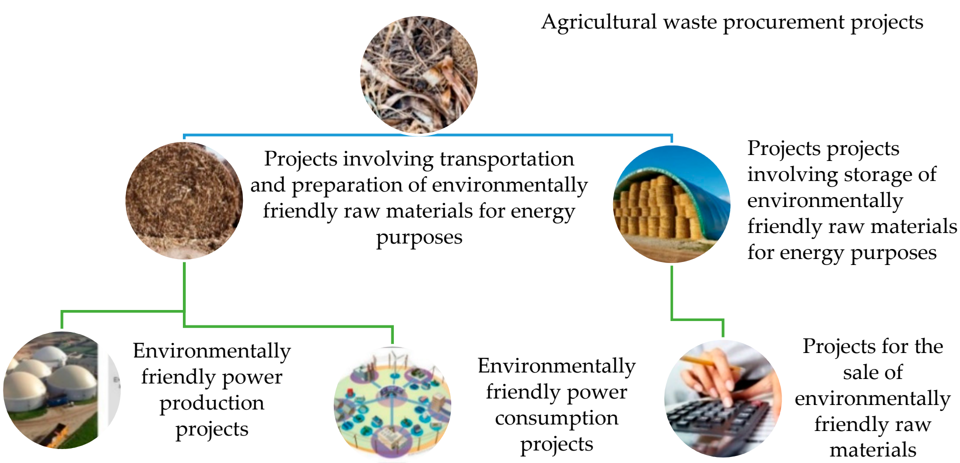

Figure 2. Structure of TIP "EGD" involving agricultural waste.

The formation of values of integrated projects is systematic and depends on the formation of values of individual subprojects. Evaluating the values created by integrated projects quantifies the benefits for their stakeholders. Each project has trappings of temporality and uniqueness and is characterized by the use of limited resources (vehicles, drivers, consumables, etc.). The territory wherein the implementation of projects is planned also has limited resources, which determines the number of simultaneously implemented projects involving agricultural waste.

The authors propose a division of all TIP "EGD" involving agricultural waste into three taxonomic groups, which are foundational for their identification and the subsequent development of tools for their management (Table 1).

The proposed taxonomy of projects involving agricultural waste includes:

- features of the project (scale, resources, duration, complexity, adaptability, experience, and knowledge);
- product of the project (typ. of service, volume of provided service);
- requirements of project stakeholders (requirements for resources for the production of clean energy, duration, and responsibility for the quality of work performed).

Projects involving agricultural waste and their components are interconnected in four ways, which reflect:

(1) receip. of information (information);
(2) supply of resources (resource);
(3) the impact of the project environment (information);
(4) management decisions (information).

By changing the individual characteristics of the links (volumes, deadlines, timeliness, etc.), a maximum value for stakeholders can be created in a given project environment (individual state, region, or community). This project environment is changeable, which adds risk to the value of projects implemented in a given area.

The components of the stakeholder risk value in the systematic implementation of projects are as follows (Figure 3):

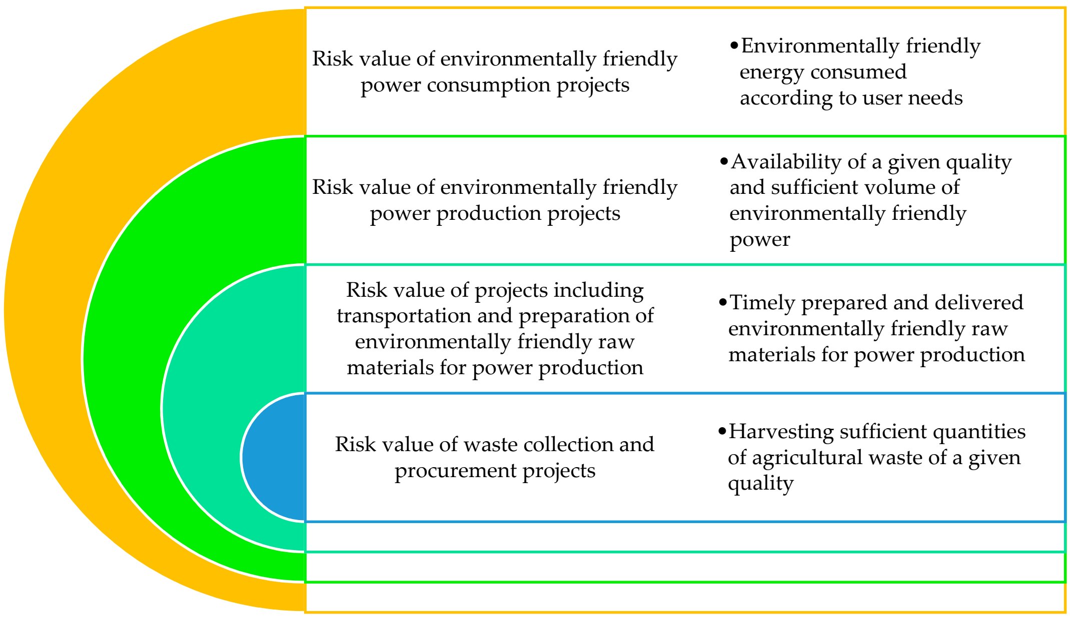

Figure 3. Components of risk values of TIP "EGD" involving agricultural waste.

Table 1. Taxonomy of TIP "EGD" involving agricultural waste.

Indicator	Characteristic		
Typ. of Project	**European Green Deal Projects**		
Taxonomic ranks	Features of the project	Product project	Stakeholder requirements for the project
Taxonomy	Scale, amount of resources, duration, complexity, adaptability, experience, and knowledge	Type/volume of products (services)	Requirements for resources, duration, quality, and liability

Basic value risks are systemic value risks ($R_{V^v_{TIP}}$) of integrated projects using agricultural waste for raw materials, which arise during the temporary operation of technologically integrated project management in a given project environment (individual country, region, or district). They have two components:

$$R_{V^v_{TIP}} = \left\langle R_{V^m_{TIP}}, R_{V^m_{Pi}} \right\rangle \tag{1}$$

where $R_{V^m_{TIP}}$ is value risks in management decisions related to the peculiarities of the implementation of many projects with the use of agricultural waste for raw materials and $R_{V^m_{Pi}}$ is value risks in management decisions related to the peculiarities of the implementation of certain types of projects related to projects with the use of agricultural waste.

However, the derivative value risks related to the implementation of certain types of TIP "EGD" projects involving agricultural waste $R_{V^m_{Pi}}$ comprise three elements:

$$R_{V^m_{Pi}} = \left\langle R_{V^a_{Pi}}, R_{V^{pr}_{Pi}}, R_{V^v_{Pi}} \right\rangle \tag{2}$$

where $R_{V^a_{Pi}}$ is value risks related to actions taken at certain levels of projects involving agricultural waste; $R_{V^{pr}_{Pi}}$ is value risks regarding products of separate integrated projects with the use of agricultural waste; and $R_{V^v_{Pi}}$ is value risks related to using the products of individual projects in accordance with their purpose.

What is important in the formation of value risks in the implementation of certain types of projects $R_{V^m_{Pi}}$ are the value risks $R_{V^a_{Pi}}$ related to actions taken at certain levels of integrated projects for the use of agricultural waste. These, in turn, cause risks to the value of products of individual projects—$R_{V^{pr}_{Pi}}$. Risks to products of separate integrated projects for the use of agricultural waste involving agricultural waste ($R_{V^{pr}_{Pi}}$) pose a value risk for use according to their purpose—$R_{V^v_{TIP}}$.

The value risks ($R_{V^v_{Pi}}$) of using the products of individual projects for their intended purpose affect the systemic value risks of the implementation of TIP "EGD" involving agricultural waste—the use of the final product of these projects—$R_{V^v_{TIP}}$:

$$R_{V^v_{Pi}} \Rightarrow R_{V^v_{TIP}} \tag{3}$$

At the same time, the risks of the value of using the final product of integrated projects ($R_{V^v_{TIP}}$) are formed from many risks of the value of using the products of projects in accordance with their purpose ($R_{V^v_{Pi}}$):

$$R_{V^v_{TIP}} = f\left(R_{V^v_{Pi}}\right) \tag{4}$$

A model of risk formation in integrated projects with the use of agricultural waste is presented in Figure 4.

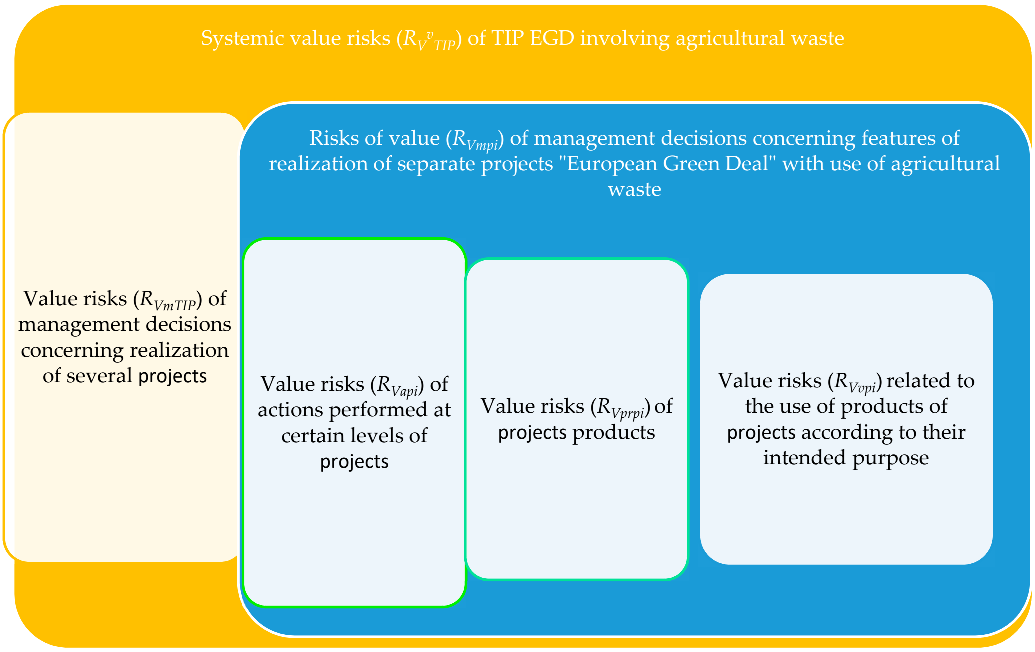

Figure 4. Model of risk formation of values of TIP "EGD" involving agricultural waste.

When it comes to projects, the value risks related to management decisions ($R_{V^m_{TIP}}$) of projects involving agricultural waste affect the risks to the value of management decisions ($R_{V^m_{Pi}}$) related to the implementation of certain types of projects:

$$R_{V^m_{TIP}} \Rightarrow R_{V^m_{Pi}} \quad (5)$$

At the same time, the value risks of management decisions ($R_{V^m_{Pi}}$) of certain types of projects determine all other components of value risks within the chain of these integrated projects:

$$R_{V^m_{TIP}} \Rightarrow R_{V^m_{Pi}} \quad (6)$$

All other types of stakeholder value risks determine the consistent impact of the value risks of previous projects on subsequent ones. Among them are the value risks related to the use of the product and those related to the transportation and preparation of environmentally friendly raw materials for power production. These have an impact on the value risks related to the storage of environmentally friendly raw materials (their volume and quality).

Risk management of each of these values of integrated projects requires consideration of the projects' features. For this purpose, specific tools (models, methods, and algorithms) must be developed to quantify the value risks of each typ. of projects involving agricultural waste and to justify the risk response. At the heart of this toolkit should be well-founded patterns of value risk formation, which are reflected in the dependencies (1–6) and defined in the model of formation of these risks for many projects involving agricultural waste (Figure 4). The toolkit should also account for the levels of implementation of individual projects involving agricultural waste (Figure 2) and the taxonomy of said projects (Table 1). The stakeholder value risk in projects at one level systematically affects the stakeholder risk value in projects at other levels, which requires the development of appropriate tools for the quantification of stakeholder value risk.

4. Results of the Affiliation of the Stakeholder Values and of Quantitative Risk Assessment in Grain Waste Procurement Projects

Based on the reasonable structure of TIP "EGD" and the peculiarities of project implementation in each such project, the authors justified values assigned to individual stakeholders of projects. Each of the constituent values of these projects is characterized by benefits that are different for individual stakeholders. The stakeholders in such projects are the state, project executors, resource suppliers, project managers, and clients. Each is related to individual sets of values that determine their risk (Table 2).

Table 2. Components of value for various stakeholders of TIP "EGD" and their risk indicators.

Stakeholders	Stakeholder Value Risk Components			
	Management Decisions V_{Pi}^{m}	**Actions Related to Implementation V_{Pi}^{a}**	**Product Projects V_{Pi}^{pr}**	**Use of Products for Their Intended Purpose V_{Pi}^{v}**
The state and its regions or districts	Regulatory framework	Regulation of relations by stakeholders	Market value of created products	Creating conditions for the use of products for their intended purpose
Project executors	Project configuration	Resource provision	Compliance of project products with customer requirements	Volume, quality, and cost of project products
Project clients	Budget and scale of projects	Stages and volumes of resource use	Compliance of the obtained product with the requirements of stakeholders	Satisfaction of consumers with the product
Resource providers	Adequacy of resources to the performed works	Timeliness, quality, and cost of resources	The cost of the received products of projects	—
Project managers	Effectiveness of management decisions	Consistency of actions in projects with the configuration of the project environment	Effectiveness of projects	—

Each of the mentioned stakeholders in integrated projects aims to obtain specific values from the projects, which in most cases are divergent. This manuscrip. discusses projects for the procurement of grain waste for the production of "clean" power. To accurately and quickly quantify stakeholder risks in grain waste procurement projects, based on the sound approach to quantifying stakeholder value risks in projects presented above, an application was developed based on Python 3.9 software.

Based on analysis of statistical data [10] and the necessary calculations, we assessed the stochastic characteristics of the market value of grain waste and the collection of said waste in individual agricultural enterprises of Ukraine (Table 3). Data on the market value of grain waste were obtained following an analysis of official statistical data provided by the National Statistics Office of Ukraine. Data on the cost of grain waste collection in some agricultural enterprises in Ukraine were obtained using a developed model, which was tested for adequacy. This model, based on machine learning algorithms, took into account the subject, technical, technological, production, and organizational factors of the cost of collecting grain waste.

Table 3. Characteristics of grain waste's market value and the cost of its collection in terms of individual agricultural enterprises of Ukraine, in EUR/ton.

Indicator	Volume of Grain Waste, tons/ha				
	1.5	**2.0**	**2.5**	**3.0**	**3.5**
Mathematical expectation of the market value of grain waste			24.3		
Standard deviation of the market value of grain waste			4.3		
Mathematical expectation of the cost of grain waste collection in individual agricultural enterprises	20.6	16.7	14.8	13.1	11.6
Standard deviation of the cost of collecting grain waste in individual agricultural enterprises	4.9	4.7	4.15	4.0	3.8

The market value of grain waste in Ukraine is described by the normal distribution law, which is presented in Figure 5, and its statistical characteristics, which are presented in Table 3.

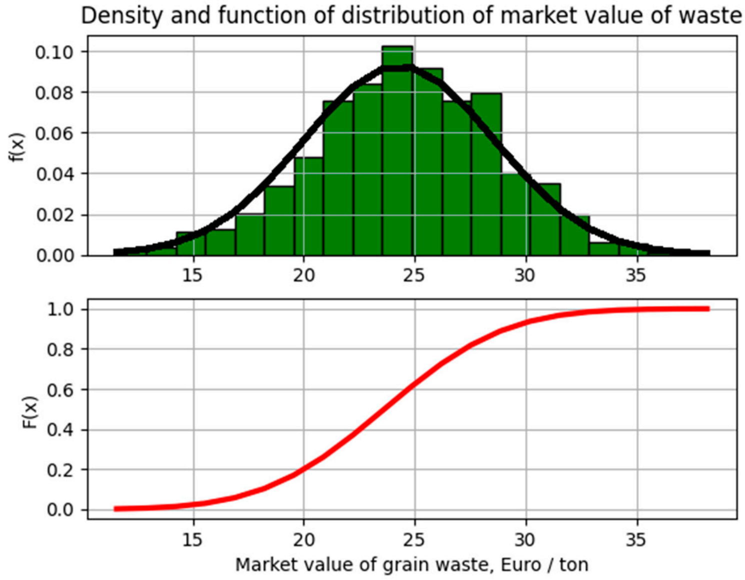

Figure 5. Density and distribution functions of the market value of grain waste for power production in Ukraine.

Based on the obtained characteristics of grain waste's market value and the cost of its collection in individual agricultural enterprises in Ukraine, dependences were observed of the mathematical expectation of the cost of grain waste collection on the specific yield of grain waste in individual fields (Figure 6) and of the standard deviation of grain waste market value on the specific volume of grain waste yield in individual fields (Figure 7).

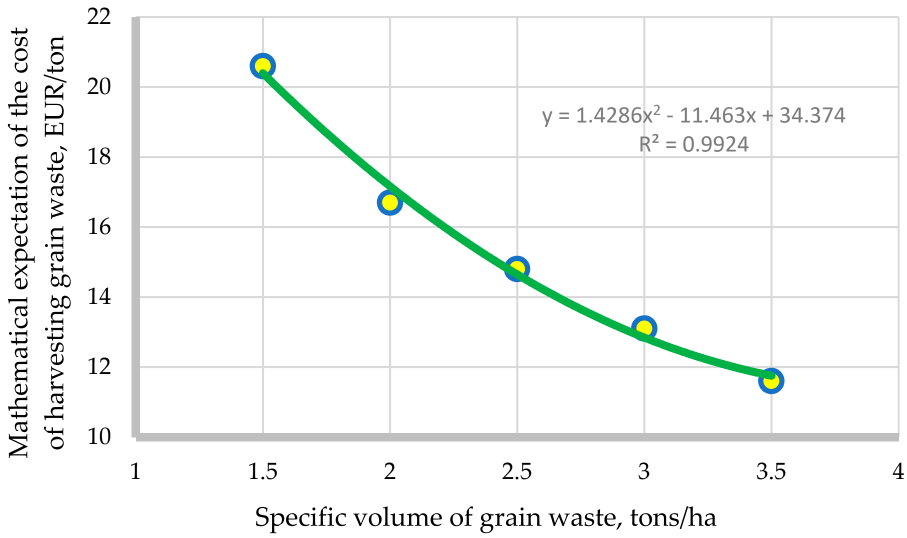

Figure 6. The dependence of the mathematical expectation of the cost of collecting waste cereals on the specific volume of grain waste yield in individual fields.

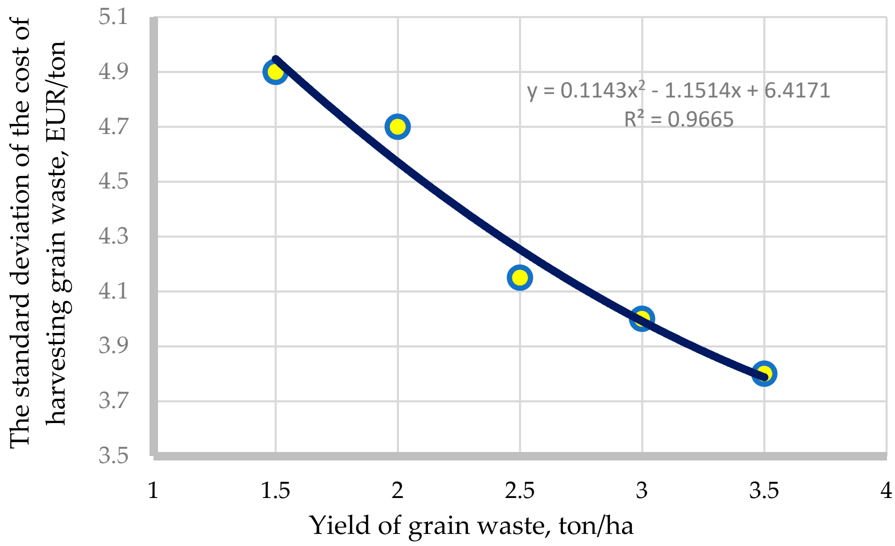

Figure 7. Dependence of the standard deviation of the cost of harvesting grain waste on the specific volume of grain waste yield in individual fields.

In particular, based on relevant calculations using data (Table 2) and a visualization thereof in Python 3.9 using the libraries Matplotlib, NumPy, and SciPy, value distributions of grain waste procurement projects were constructed at different specific yields in separate fields (Figure 8).

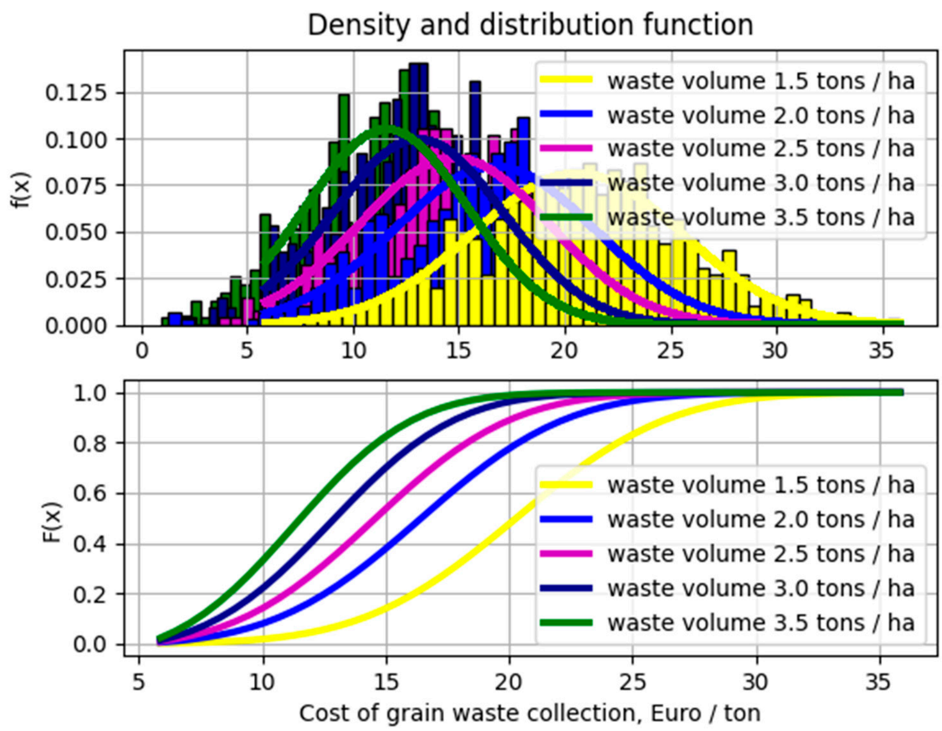

Figure 8. Density and function of cost distributions of grain waste collection.

The obtained densities and distribution functions of the cost of grain waste collection are the basis for assessing the risks to the value for investors in grain waste procurement projects. The value for investors is expressed by their profits, the trends of which are presented in Figure 9.

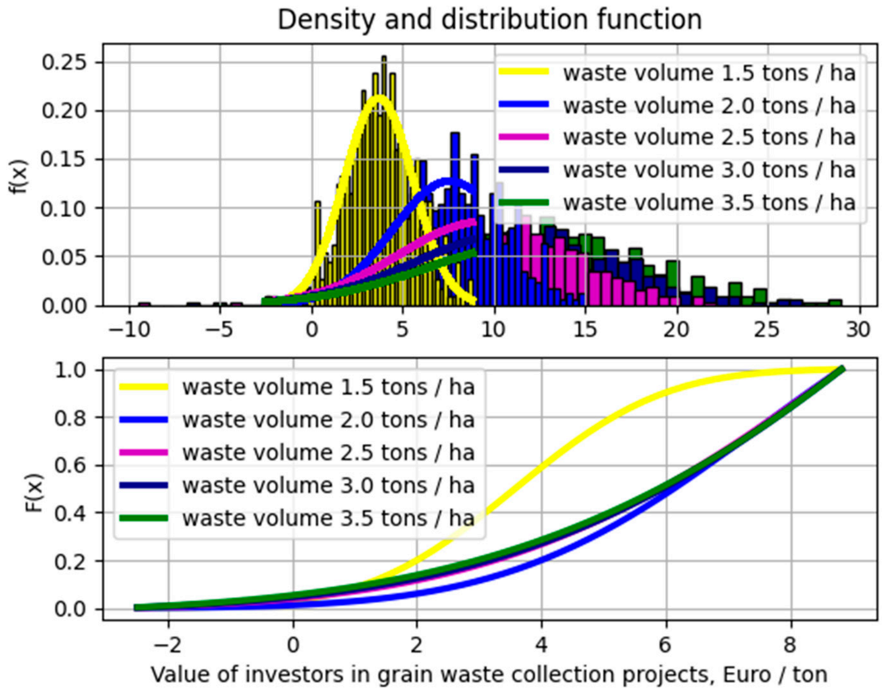

Figure 9. Density and function of distribution of value for investors in grain waste processing projects.

5. Discussion

The proposed taxonomy of projects involving agricultural waste involves the allocation of three taxonomic ranks, which were determined by the characteristics of individual projects, their products, and their requirements for stakeholders. These levels (Figure 2) and their taxonomy (Figure 3) are the foundation for creating tools for quantitative stakeholder risk assessment in these integrated projects.

Four group. of component risks of stakeholder value were substantiated. They accounted for the levels of implementation of individual projects and their taxonomy. The proposed model of risk formation of stakeholder value of TIP "EGD" involving agricultural waste is the foundation of risk management of each of these stakeholder values.

The obtained results on investor risk value assessment in grain waste procurement projects accounted for the following variable components of the project environment: (1) market (via a sound model of the market value of grain waste based on the analysis of official statistics); (2) subject (typ. of grain waste, yield of the main crop. share of waste used); (3) technical (characteristics of technical means used to collect grain waste); (4) technological (technology of grain waste collection); (5) production (conditions in the field—area, slope, configuration, soils); and (6) organizational factors (modes of organization of grain waste collection). These were used in a proprietary model, which was tested for adequacy and was based on machine learning algorithms.

Based on the obtained results on forecasting quantitative indicators of the risk value for investors in grain waste procurement projects, it was established that this risk largely depends on the amount of grain waste. For 1.5 t/ha of grain waste, the risk to the value of investors in grain harvesting projects was acceptable if the profit for investors was estimated at 0.5–2.0 EUR/ton. With 2.0 t/ha of grain waste obtained, the risk was acceptable if the profit was estimated at 1.0–3.0 EUR/ton. If grain waste was obtained at 2.5–3.5 t/ha, the risk was acceptable if the profit was estimated at 2.0–4.0 EUR/ton.

The obtained research results allowed establishing a taxonomy of TIP "EGD" involving agricultural waste and the peculiarities of their implementation. The authors propose combining complex hierarchical systems of "waste"—"raw materials"—"clean energy"—"green energy consumption"—"production of clean products or services" during the implementation of these integrated projects. This will increase the value of the project and reduce the risks of changing environmental parameters, as well as of limited resources and time. The results herein can lead to the formulation of a number of scientific and applied risk and value management tasks in integrated projects using agricultural waste. The proposed approach is presented in the model of stakeholder risk value formation in Figure 4. The forecasting of investor risks in these projects would be carried out based on "waste"—"raw materials" systems that would confirm the practical value of the offered approach and model. Further research will require the development of risk management tools for integrated projects using agricultural waste that consider the structure and features of complex hierarchical systems: "waste"—"raw materials"—"clean energy"—"green energy consumption"—"environmentally friendly production of clean products or services".

6. Conclusions

The article substantiated the need to develop tools (models, methods, and algorithms) for quantitative risk assessment of each typ. of TIP "EGD" involving agricultural waste and justification of the risk response. These tools should be based on sound patterns of risk formation for stakeholder value, which are reflected in the dependencies (1–6) and constitute the foundation of the model of formation of these risks.

The tendencies in the change in value (profits) for investors in grain waste processing projects were established, taking into account the requirements of such projects. If grain waste was received in the amount of 2.5–3.5 t/ha, there was a permissible risk to the value for investors in grain waste procurement projects if the profit for investors was planned to be 2.0–4.0 EUR/ton. The risk to investor value increases as investors' demands for profit increase. This indicates that the resulting trends in the risk to investor value (profits) in grain harvesting projects should be taken into account when planning said projects.

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