

Methods and Techniques for Evaluating and Analyzing Agri-Food Security

Mahmoud TARHINI, PhD candidate
Bucharest University of Economic Studies, Bucharest, Romania, korgcyborg@gmail.com

Correspondence should be addressed to: Mahmoud TARHINI; korgcyborg@gmail.com

* Presented at the 38th IBIMA International Conference, 23-24 November 2021, Seville, Spain

Copyright © 2021. Mahmoud TARHINI

Abstract

The overall objective of food security assessment is to measure the degree of food insecurity and to understand the risks and vulnerabilities in the agri-food sector, in order to build sustainable resilience programs. The main objective of this article is to present, by the method of comparison, the principles of an initial food security assessment in determining the complementary agricultural strategic assessment. Also, a series of particularities are identified, regarding the purpose of the agri-food security evaluation, its field of application, as well as the role of information in the field of agri-food security. The research clarifies the importance of the two assessments on measuring food security, which are necessarily based on socio-economic surveys, in order to determine the livelihoods of the community monitored and identified as being vulnerable to a possible food crisis. The omission of these framework assessments could lead to inappropriate decisions or the implementation of inefficient actions and programs in combating food insecurity, as the resulting strategic agricultural indicators will be used in the agri-food security evaluation itself.

Keywords: Agri-Food Security, Food Processing, Food Production, Insecurity.

Introduction

The current global situation presents a number of uncertainties, challenges, risks and threats that call into question transparency and consumer information on food production, processing and consumption, food security and safety. However, there is no zero risk, especially in such a sector, where the triggers are unstable and unpredictable. The economic progress and development opportunities in certain areas are not uniform and creates privileged areas, giving rise to major conflicts within socially-economical structures that cannot adapt (Dima, 2018). Moreover, there is an increasing concern regarding the lack of economic performance of the companies (Deac et al., 2016). Therefore, an integrated agri-food information system provides for collaboration with academia and the creation of public-private partnerships to help collect data from multi-sources on weather changes, crop developments and agri-food yields (Lezoche et al., 2020). The purpose of an integrated agri-food information system is to forecast the evolution of the agricultural segment and to inform the beneficiaries from the public-private environment on the operative and strategic methods of stopping the agri-food insecurity factors (Di Vaio et al., 2020), which would represent a competitive advantage for all actors in the markets at national, European and global level.

Society is increasingly in need of agri-food information, while industrial food systems must remain competitive and sustainable (Kalfagianni & Skordili, 2018). Future agricultural advisory systems will be able to generate strategic knowledge and will be oriented, including, towards the provision of political information, which will become useful in strategic decision-making (Corallo et al., 2018).

In the context of increased competition, quality represents a fundamental condition for the competitiveness of firms producing goods at global level (Dobrin et al., 2015). Early warnings and strategic scenarios will become tools in the effective

Cite this Article as: Mahmoud TARHINI, Vol. 2021 (35) "Methods and Techniques for Evaluating and Analyzing Agri-Food Security", Communications of International Proceedings, Vol. 2021 (35), ISBN: 978-0-9998551-7-1, ISSN: 2767-9640. Article ID 38137221.

management of challenges and, at the same time, will interconnect the agricultural sector with all adjacent sectors. Obviously, it will be necessary to create strategic agendas that are in line with those of the EU for better operational, tactical and decision-making cooperation on food security (Muscio & Sisto, 2020). Early warnings on ensuring agri-food security imply a mandatory assessment of agri-food factors in terms of short, medium or long-term effects. However, the complexity of indicators in the agri-food sector makes it almost impossible to have zero risk, especially in such a sector, where the triggers are unstable and unpredictable (Yakovenko et al., 2018).

In addition, new global challenges in the agri-food segment require a reassessment of information sources and also a resizing of knowledge to create innovation (Fait et al., 2019). Moreover, the usefulness and relevance of food security analysis will increase with the reform of the agri-food policy system, which will aim to ensure socio-economic and food security from the perspective of three interdependent pillars: education, research and innovation (Perez-Escamilla et al., 2017; Saint Ville et al., 2019).

Literature Review

According to previous research, the main cause of agri-food insecurity is poverty (Laborde, Martin & Vos, 2020) and the emergence of the economic sector (Brooks, 2016), in the context of strategic resource control, economic instability, population growth and increased climate change. Therefore, agri-food insecurity can be of an eco-strategic nature (limitation of agri-food resources, insecurity of agri-food stocks, etc.) (Karthika & Karthikeyan, 2016; Borras & Mohamed, (2020), but also of a geopolitical and economic nature (control of the national economy by inserting foreign capital) (Sommerville, Essex & Le Billon, 2014; Lambert & Hashim, 2017).

Therefore, in this new paradigm of agri-food security, the threats are of a socio-economic and geopolitical nature (Bullock et al., 2017), to which are added corruption (Frantsisko et al., 2020), poor governance (Wieck, Rudloff & Heucher, 2014), and vulnerabilities induced by information globalization (Brooks & Loevinsohn, 2011), where access to strategic information may become restricted for certain categories in the absence of an information system on agri-food security. This systemic dependence can induce endemic crises and conflicts if all factors involved are corroborated (Vanhaute, 2011). A new agri-food security policy is needed to help states anticipate future cross-system threats and address new agri-food security challenges.

New global challenges in the agri-food segment, as well as in any modern organization, require a reassessment of information sources and a reinterpretation of it to create innovation (Dima, 2020). To this end, a review of agri-food policy systems is needed to increase the usefulness and relevance of the agri-food sector.

Methodology

In the context of an emerging economy, climate change and increased population growth, and also with an insufficiently integrated agri-food sector in current socio-economic systems, this research proposes, through an inter-systemic approach, the presentation of the main methods and techniques for evaluating and analyzing agri-food security. The results of the analysis undertaken pursue the following four objectives:

- *O1.* Presenting the method of initial food safety assessment;
- *O2.* Presenting the method of strategic evaluation of food security;
- *O3.* Assessing the ratio between the initial assessment and the strategic assessment of food security;
- *O4.* Evaluating methods and techniques for the analysis of agri-food security.

Research Findings

The commissioning of a systemic network is carried out following a diagnostic analysis and by developing agri-food strategies at local level, but also by implementing alternative and intelligent programs and policies for the sustainable development of the agri-food sector.

In addition, the operationalization of an information system on agri-food security can become a means of information exchange, a process that will contribute to the deconstruction of old mechanisms and issue new strategic solutions to counteract risks and vulnerabilities in the agri-food sector. Therefore, the systemic model on agri-food security can become an alternative solution to the current agri-food challenges, in which the public and private environment, civil society and other actors adjacent to the agri-food sector will function integrated and intelligent in the structure of information

communities. The efficient implementation of the system, from a methodological and operational point of view, in an unstable and emerging socio-economic and geopolitical context, will become a challenge.

The process of collecting primary information involves different methods and techniques of gathering information, each of the collection tools used producing different results in relation to secondary information. At this stage, the emphasis is on collecting useful and relevant information for an agri-food analysis, coming directly from the community vulnerable to agri-food insecurity or already affected by an acute or cyclical food crisis.

Method of Initial Food Safety Assessment

The initial assessment should focus on three areas of monitoring: the livelihoods of the community under assessment, the risks and threats to which the population is vulnerable and, last but not least, the resilience of the community vulnerable or affected by food insecurity.

Regarding livelihoods, one must consider the different ways in which the population uses to survive. Therefore, it is important to have an intersectoral and multidimensional approach in defining the monitoring indicators for the initial evaluation:

- the natural/geographical environment in which the community lives, such as: climate and climate change, relief, forests, pastures, mineral resources, rivers and lakes, land fertility, etc., availability and access to critical infrastructure and agri-food services (i.e., means of transport, agri-food markets, medical and educational centers, labor market, etc.),
- the socio-political and administrative context of the monitored region subject to evaluation,
- the different agricultural and non-agricultural activities carried out,
- the productive or non-productive assets owned by the natural persons in the area (types of agri-food products, agricultural crops, livestock, agricultural lands and their means of transport, etc.).

This identification of goods is necessary to achieve a classification of social groups vulnerable to food insecurity, according to their socio-economic status and their ability to survive in a food crisis.

A second indicator, which must be taken into account in the initial assessment of food security monitoring, is the identification of risk factors, threats and the likelihood of their occurrence. The population is frequently exposed to risks, which could frequently influence the standard of living of the assessed community. Therefore, the risks of food insecurity could be defined as the probability of negative consequences (poverty, pollution, climate change, economic crises, geopolitical conflicts, etc.) resulting from the interaction between natural or artificial hazards and their degree of vulnerability. It is very important to identify the extent of potential risks, which may trigger a food crisis or which may influence the standard of living of the monitored community.

The third reference indicator in the initial food security assessment is the resilience and adaptation capacity of the monitored population to food risk situations and crises. This resilience can be ensured by developing sustainable medium- and long-term strategies at the local level.

According to the above, the initial assessment should not be performed frequently, because the livelihoods of the population are evolving quite slowly. A food security assessment may be updated every five years or more, or when a dramatic change affects the reference conditions (such as: natural disasters or a political-administrative reconfiguration) at local or national level.

However, in the process of the stated assessment, all livelihood systems at national level must be taken into account, this complex and extensive monitoring helping to pinpoint the groups vulnerable to food insecurity. In addition, the high costs of an initial baseline assessment impose a limitation on the areas where risks of food insecurity may occur.

Understanding the context in relation to changes and trends in the agri-food sector is based on the information provided following the initial baseline assessment, taking into account the monitoring of a group vulnerable to food insecurity at a given time. It is advisable to periodically repeat such an assessment in order to constantly identify changes and trends on the subject.

The initial assessment leads to a deeper understanding of the impact of possible natural disasters, through the previous creation of emergency response plans. Describing a situation before the shock occurs helps to better understand how the community and institutions might cope, but also to measure the degree of intervention of external assistance in exceptional situations.

We consider that in this case the initial assessment of food security has two main objectives:

- a) establishing and defining the indicators through which the living standard of the community vulnerable to food insecurity can be measured;
- b) understanding the insecurity factors that can affect the living standard of the rural community.

The secondary objectives of the evaluation are equally important, because they focus on the following directions:

- territorial identification of groups vulnerable to food insecurity, where their food security and livelihood safety present major vulnerabilities;
- data collection and analysis, which could help to measure the degree of intervention or to modify the actions and strategic programs previously applied to the community affected by food insecurity.

Method of Strategic Evaluation of Food Security

A strategic assessment of food security has as its main objective decision-making, as it can provide strategic information to decision-makers on: the need for intervention, the nature and extent of the intervention requested, the priority planning and allocation of resources and the effectiveness of actions and decisions included in within the previously formulated intervention program. The first stage in a strategic assessment is to define and clarify the problem of insecurity, which affects the community at a given time. This approach becomes useful and relevant in order to formulate strategic recommendations, which would translate into agri-food programs or policies.

Initial baseline assessments of food security become useful and relevant information flows for strategic analysis. These evaluations are built on the structure of a diagnostic analysis having a triple role:

- to understand the context in relation to changes and trends in the agri-food sector;
- to provide strategic information for future poverty reduction policies and strategies;
- to support emergency programs and projects and to mitigate the impact of natural disasters.

Strategic information for future agri-food policies and strategies is obtained from a strategic assessment of data processing on the livelihoods of the population vulnerable to food insecurity, as their purpose is to increase the resilience or capacity of the community to adapt to food crises.

This strategic information obtained in a strategic assessment does not help to justify how the objectives were achieved in a previous program to combat food insecurity. They provide an overview of the context and situation, as well as additional data to initiate new programs or policies in the agri-food sector vulnerable to food insecurity.

More specifically, this strategic information focuses on: the extent and duration of the identified problem, the establishment of vulnerable groups, what would be the recommendations and strategic solutions to combat and increase the living standards of the affected community and what would be the evolution of the identified problem in the absence of counteracting vulnerabilities and threats of food insecurity.

In the case of an emergency food security assessment, the indicators are defined on the basis of the lack of food availability (for example, in the case of a poor harvest due to a prolonged drought), as an assessment of the main crops may result in predictions on crop yields, which could prevent food insecurity. Also, the evaluation indicators will be defined and monitored starting from the access to basic foods, as a result of a dysfunction of the agri-food market characterized by price volatility. A market crisis could be due, for example, to rising commodity prices or a lack of agri-food stocks. In this case, the evaluation results must be transformed into strategic solutions, which contribute to the allocation of financial resources, increase human and logistical resources, but also generate planning aimed at increasing efficiency in the commercial sector. These results can also be used as advocacy tools to motivate the (non) governmental environment on the issue of food insecurity and, at the same time, to demand and justify the need for funds to combat the dysfunctionality created.

The Ratio between the Initial Assessment and the Strategic Assessment of Food Security

The difference between the initial reference assessment of food security and the strategic evaluation itself, consists in the particularity of the objectives of each.

The initial assessment helps decision-makers to understand the context, to be aware of the level of food security at a given time, to focus on information flows in the medium and long-term planning and monitoring process and to issue views with on pre-crisis situations through a comparative analysis.

The strategic evaluation focuses on the actual analysis of the identified food insecurity issues, being oriented especially on the results and the impact in order to allocate corrective measures or the application of strategic actions or solutions.

There are three main differences in the scope of the two methods of evaluation and analysis:

- the issue under evaluation or analysis,
- the intervention period,
- the geographical dimension of the intervention.

While the initial baseline assessment may refer to a variety of factors that could affect a community's food security, the strategic assessment focuses on a specific issue, as its purpose is to find solutions and issue recommendations in making the strategic decision.

From the perspective of the intervention period, the initial reference assessment can extend up to 4-5 years, if the situation does not change dramatically. In the case of strategic evaluation, it can occur at any time, given that the onset of a specific situation can occur at any time without a specific period.

From a geographical point of view, the initial reference assessment may cover a wide area at national or regional level, while the strategic assessment is usually limited to a specific region, where the issue is characterized by food insecurity.

Regarding the use of information, the differences are major in the case of the two methods of measuring food security. In this case, the number of people who will use the results of the two methods and how the information is used will be taken into account. The initial reference evaluation has as beneficiaries a significant number of users, because its objective is to design policies for medium- and long-term development, but also for the academic research environment. The purpose of the information provided by the strategic assessment is to change the course of a project or program, to save lives or to improve the living standards of the population affected by poverty or hunger.

However, the way in which the two methods interact must also be taken into account, given that there are two actions that become complementary through their use and application in the case of interventions against food insecurity. First, the initial baseline assessment results in a diagnostic analysis, which becomes useful and necessary for strategic assessment to understand the context of food insecurity. Also, the interdependence between the two intervention methods consists in the provision and exchange of pre-crisis information (reference assessment) vs. post-crisis information (strategic analysis). Ultimately, the baseline assessment helps to identify the population suffering from chronic food insecurity, compared to the community temporarily affected by food insecurity.

Therefore, if the initial baseline assessment focuses on understanding a current situation of food insecurity, the strategic assessment depends on the diagnostic analysis provided by it, because its purpose is to perform an in-depth analysis of a specific current situation. At the same time, the initial evaluation defines the indicators to be measured within the strategic evaluation.

The initial reference assessment can be performed and issued by certain actors, given that it is flexible over time and allows a detailed analysis in the form of a diagnostic analysis or inventory of data: human resources from academia, members of national NGOs and international, civil servants at central or local level.

Instead, strategic evaluation brings together different experts and mobilizes extensive human resources, with a multidisciplinary knowledge and an intersectoral approach. Analysts could come from civil society, from an institutional or organizational level, representatives of the business environment or from the academic environment, etc. It is not excluded that researchers from academic institutions and research centers will also be involved in the benchmarks, when the interpretation of the data involves certified analytical skills.

In conclusion, strategic evaluation is useful to solve a food insecurity problem and to turn the results into strategic solutions and actions. This type of assessment can help change current or future actions because it is based on the prediction method. It offers new directions of action in an emergency situation and, at the same time, addresses the issue in depth. If the initial evaluation focuses on the context analysis, instead the strategic evaluation issues landmarks and solutions for making the strategic decision.

Methods and Techniques for the Analysis of Agri-Food Security

A peculiarity in the process of strategic analysis in agri-food is the need to evaluate and analyze the indicators of the current security environment, even if, sometimes, they are hypothetical. It is necessary to obtain relevant information on a normal year (characterized by food security) which must be compared with the situation of an atypical year affected by food insecurity.

The purpose of the hypothetical analysis is to understand the situation before the crisis and after the food crisis, its objective being to propose resilience programs for the community affected by food insecurity, they are structured on sustainable strategic axes.

Experts in agri-food intelligence analysis build scenarios to constantly measure and estimate the results on the balance of food security. They make assumptions about the evolution of agri-food security, taking into account how these assumptions could affect food accessibility and staple food availability. Then, based on the convergence of evidence, they most likely determine the scenario and classify the resulting level of food insecurity, with the aim of identifying the unpredictable event that could change the outcome, which will then be communicated to beneficiaries in the agri-food sector. These evolution scenarios form the basis of strategic reports, published periodically (weekly and monthly) based on alerts issued by experts in the field.

Therefore, strategic analysis can prevent and combat three types of food insecurity:

- *Chronic food insecurity* (when a person or group of people has not had access to basic food for a long time).
- *Cyclic food insecurity* (affects small farmers, who have food availability immediately after harvest, but may not be able to secure food until the next harvest).
- *Transitional food insecurity* (affects urban dwellers, who depend on highly unstable markets and agricultural producers exposed to natural disasters and climate change).

Food Security Context Analysis Method

The context analysis is structured on a set of questions, and the results will be closely related to the secondary and primary information previously collected. Given that its purpose is to prevent and combat existing or possible food insecurity, it can provide knowledge of either the pre-crisis or post-crisis food situation. Therefore, the context analysis will focus on the livelihoods themselves, the resources available to the community, the critical infrastructure of the region, the relevant historical data, incomes, prices, agri-food sources at the local level.

The informational matrix for the situation before the food crisis will include a series of strategic indicators, based on which a series of interrogations will be formulated, starting from the secondary and primary information previously collected. If the context analysis is performed during a food crisis, then the questions will focus exclusively on the state of the affected community, where the measurement of food insecurity will be done directly, with the aim of creating strategies for food insecurity. endurance and adaptation.

Scenario Analysis Method of Food Security

The scenario analysis involves an estimation of agri-food factors from the perspective of short-, medium- and long-term effects, it aims to prevent food insecurity (Fig 1.). However, the complexity of the indicators in the agri-food sector makes it almost impossible to have zero risk, especially because the triggers are unstable and unpredictable.

Regardless of the region, food security depends on water resources (rainfall, irrigation), commodity price volatility, seasonal labor demand, food production, government social assistance (policy stability and financial assistance), regional conflicts, all these being just some of the trends that influence food security. Given this complexity, it is impossible to predict food insecurity with perfect accuracy.

What must be emphasized is that it is based on the analysis of an uncertain situation starting from certain hypotheses, where by the deductive and inductive method probable solutions can be issued. In essence, scenario analysis is a hypothesis built on the phrase "if - then", which gains rigor only through a strategic analysis.

The analysis on food security scenarios is based on the formulation of specific assumptions and information on future events, following the likely effects and developments of the various actors involved in the agri-food sector. Combined with a context

analysis, it can provide estimates of a food insecurity situation. In this respect, a clear description of the main assumptions is needed to outline a relevant analysis, providing the beneficiaries with useful and relevant information for the strategic decision-making process.

In ***the first stage, in the elaboration of the analysis on scenarios***, it is obligatory to formulate four hypotheses of truth. First of all, it is necessary to determine the geographical extent of the scenario, for which perimeter the actual scenario is elaborated: A subsistence area, a region or a small administrative territory?

The ***second stage*** begins by ***reporting to the context analysis***, which will analyze: the recent price of agri-food products, the evolution of the agricultural year and financial allocations from the state budget or international aid. The analysis will continue with the ***description of the impact of food security on the monitored subsistence farms***.

In the ***third stage, the key hypotheses tested on trends will be formulated***, which could occur in the future from the perspective of food security, within the evolution scenario. This stage consists of two parts: *identifying relevant food security factors or indicators and monitoring the risks that may occur during the evolution scenario*, as part of the strategic analysis, for example: a policy decision on the provision of subsidies to farmers may occur at a short distance after the announcement of a possible drought.

Once the probable threats have been identified, the hypotheses will be formulated according to the date, duration and severity of the situation. Sectoral experts, historical data and their own expertise will be used to formulate these hypotheses, in order to estimate the impact of these risks in the future analysis stages.

In ***the fourth stage, the current context is analyzed by referring to the hypotheses formulated in the third stage***, from the perspective of the impact on the sources of income in the households, as follows:

- identification of the own sources of income of the groups of households subject to analysis throughout the scenario;
- the use of information on the means of subsistence available and the inclusion of the expert's own judgment;
- the location of each source of income in relation to a normal year;
- customizing each source of income that may be available during the scenario;
- changes in the amount or date of income provided for in the previous stages;
- constructing a sentence that compares the total income at the household level, during the analyzed period, with those of a typical year.

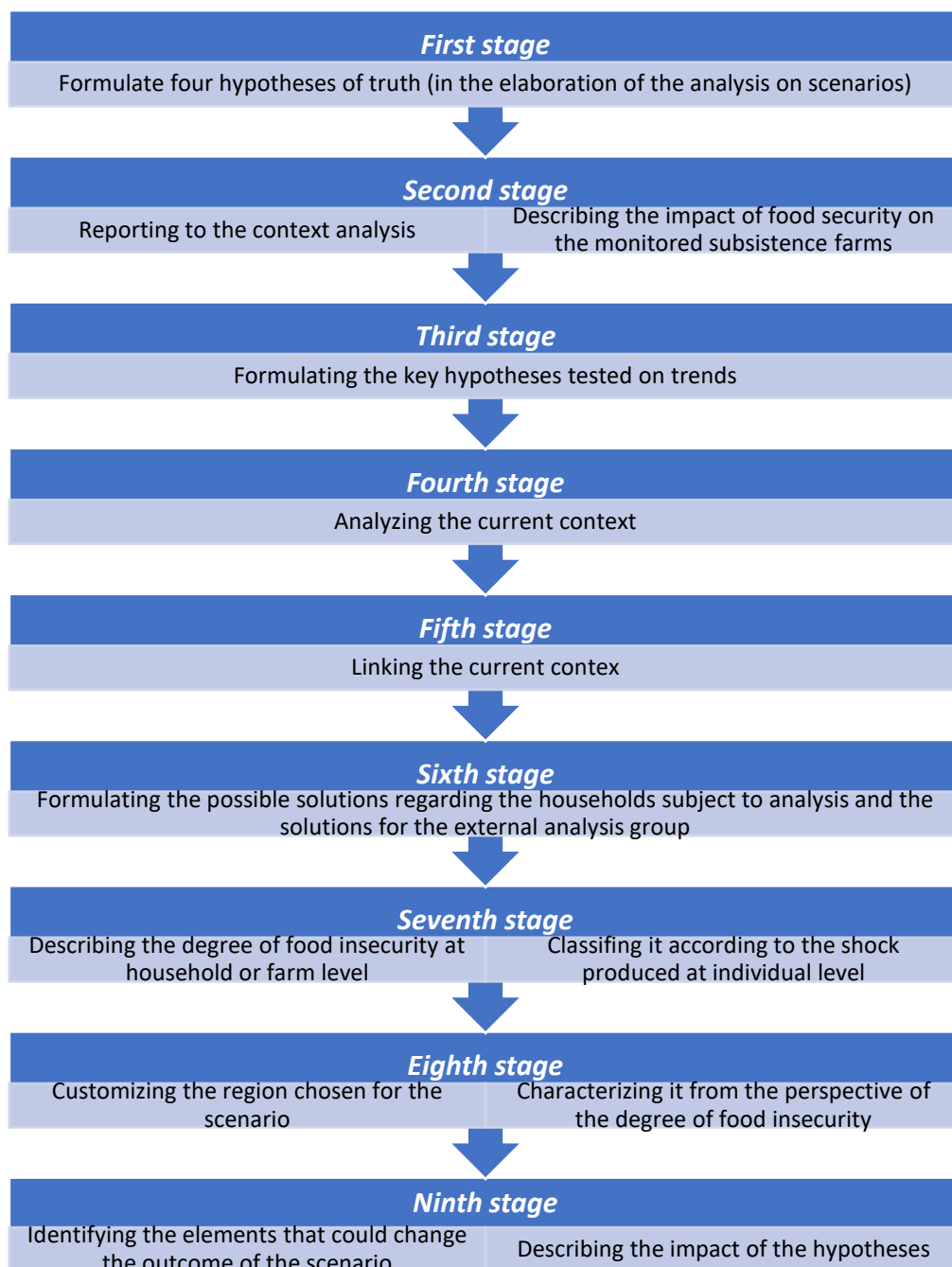


Fig 1. Scenario Analysis Method of Food Security

Source: Author

The *fifth stage* is very similar to the fourth stage in its structure, but *it is focused on the food source*. The aim of this stage is to link the current context, the assumptions made in the third stage and the outlook on household incomes in the fourth stage, on the one hand, and the impact on access to food at the household level, on the other. The expert in information analysis will focus on the following information:

- identifying the food sources to which households are connected;
- the means of subsistence available to a household and the inclusion of the value judgment of the expert to describe the importance of each food source during the evolutionary scenario;
- comparing access to food for each source, by reference to a normal year;
- changes in the quantity or date of access to food provided on each of the above sources.

In *the sixth stage, the possible solutions regarding the households subject to analysis and the solutions for the external analysis group will be formulated*. These response hypotheses (solutions) will form the basis of the resilience program to be applied to the community affected by food insecurity.

In *the seventh stage, the degree of food insecurity at household or farm level will be described and it will be classified* according to the shock produced at individual level.

In *the eighth stage, the region chosen for the scenario will be customized and characterized*, from the perspective of the degree of food insecurity, going through two stages of analysis: *the probable description of malnutrition or mortality and measuring the level of food insecurity for the region of the scenario*.

In *the ninth stage, the elements that could change the outcome of the scenario will be identified and the impact of these hypotheses will be described*. This stage allows decision makers to recognize the level of uncertainty of the most likely scenario and to manage the other possible outcomes.

In the process of planning, collection, evaluation and strategic analysis, it is recommended to observe the guiding principles: use of an internationally agreed specialized vocabulary, use of historical data as basic information in developing hypotheses, analysis of regional and international context, clear descriptive analysis and focused on the effects of food security in time and space, the analysis of food security effects must be closely linked to an economic approach and, last but not least, the reporting of primary and secondary information collection planning and strategic analysis to the livelihoods of community affected by food insecurity.

Agri-Food Security Risk Analysis Method

The risks result from the monitoring of hazards and vulnerabilities in an area prone to food insecurity. Risk assessment involves the systematic collection and analysis of primary and secondary data, taking into account the dynamic nature of hazards and vulnerabilities: from cross-cutting issues (for example: urbanization), changing land use, regional and local conflicts, price index to food, environmental degradation and climate change. Risk assessment and mapping prioritizes needs and guides the construction of resilience programs for the agri-food sector.

Monitoring and Early Warning

Early warning capability is the strong point of intelligence analysis. Continuous monitoring of hazards and vulnerabilities in the agri-food sector will be built on early warning indicators, which will focus on the assessment and mapping of the risks themselves.

Dissemination of Strategic Knowledge

The warnings are addressed to beneficiaries in the (non) governmental environment or to the community vulnerable to the risk of food insecurity. Messages must be clear, concise and built on simple and relevant information, with the aim of preventing and combating food insecurity.

The communication channels of strategic information represent an integrated and extended information network, because the consolidation of the early warning message determines the impact of actions and resilience programs at local or regional level.

It is essential to have all the necessary information before moving on to the actual strategic assessment and analysis stage, in order to effectively manage the food crisis. Therefore, for the preparation of a food security assessment it is important to follow a mission plan, which includes the vulnerable area under monitoring, a description of the target group more or less affected by food insecurity factors.

An efficient collection of useful and relevant information is achieved with the help of concept maps of food security, they become tools for planning and collecting primary and secondary information, in order to understand the context of food security.

In conclusion, the planning and the criteria for collecting strategic information must be continuously related to the data necessary for the evaluation and strategic analysis, given that the intelligence analysis will constantly monitor:

- trends (monitoring of prices for basic agri-food products);
- indirect indicators (meteorological data are used to estimate future cereal production, by reference to the frequency of precipitation);
- multiple indicators (data on agri-food stocks related to critical transport infrastructure, indicators that can influence the level of prices in the short term, in poor weather conditions);
- early warning indicators (necessary to prevent food insecurity).

Conclusions

An agri-food security assessment includes a detailed analysis of the security environment (context analysis method), more specifically a descriptive diagnostic analysis, regarding the vulnerable community and which is exposed to the risk of food insecurity. Instead, the strategic evaluation defines new directions of action, in case of an emergency situation and, at the same time, addresses the issue in depth, because such an evaluation focuses on the food insecurity issue previously assessed, it is mainly focused on results and impact in order to allocate corrective measures or apply new resilience strategic actions or solutions.

In our opinion, the solution to counter future threats to agri-food security would be a new strategic approach to national and economic security, where strategic and operational methods can intervene at the decision-making level and allow the efficient management of strategic resources. in the context of climate change.

References

- Borrás, A. M., & Mohamed, F. A. (2020). Health inequities and the shifting paradigms of food security, food insecurity, and food sovereignty. *International Journal of Health Services*, 50(3), 299-313.
- Brooks, S. (2016). Inducing food insecurity: Financialisation and development in the post-2015 era. *Third World Quarterly*, 37(5), 768-780.
- Brooks, S., & Loevinsohn, M. (2011, August). Shaping agricultural innovation systems responsive to food insecurity and climate change. In *Natural Resources Forum* (Vol. 35, No. 3, pp. 185-200). Oxford, UK: Blackwell Publishing Ltd.
- Bullock, J. M., Dhanjal-Adams, K. L., Milne, A., Oliver, T. H., Todman, L. C., Whitmore, A. P., & Pywell, R. F. (2017). Resilience and food security: rethinking an ecological concept. *Journal of Ecology*, 105(4), 880-884.
- Corallo, A., Paiano, R., Guido, A. L., Pandurino, A., Latino, M. E., & Menegoli, M. (2018, June). Intelligent monitoring Internet of Things based system for agri-food value chain traceability and transparency: A framework proposed. In *2018 IEEE Workshop on Environmental, Energy, and Structural Monitoring Systems (EESMS)* (pp. 1-6). IEEE.
- Deac, V., Dobrin, C., Dima, A., & Voicu, L. V. (2016). Profit Maximization Through a Differential Pricing Strategy. In *Proceedings of the International Management Conference* (Vol. 10, No. 1, pp. 234-244). Faculty of Management, Academy of Economic Studies, Bucharest, Romania.
- Dima, A. (2018). Where is Production Industry heading In the Context of Globalization 2.0. In *Proceedings of the 31st International Business Information Management Association Conference (IBIMA)* (pp. 1262-1273).
- Dima, A. (2020). Exploring the Role of Entrepreneurship and Innovation in the Privatization Process, In *Proceedings of the 35th International Business Information Management Association Conference (IBIMA)* (pp. 14693 – 14701)
- Di Vaio, A., Boccia, F., Landriani, L., & Palladino, R. (2020). Artificial intelligence in the agri-food system: Rethinking sustainable business models in the COVID-19 scenario. *Sustainability*, 12(12), 4851.
- Dobrin, C., Gîrneală, A., Uda, M. M., & Croitoru, O. (2015). Quality: a determinant factor of competitiveness—the evolution of iso certifications for management systems. In *Proceedings of the International Management Conference* (Vol. 9, No. 1, pp. 1062-1073).

- Fait, M., Scorrano, P., Mastroleo, G., Cillo, V., & Scuotto, V. (2019). A novel view on knowledge sharing in the agri-food sector. *Journal of Knowledge Management*.
- Frantsisko, O. Y., Ternavshchenko, K. O., Molchan, A. S., Ostaev, G. Y., Ovcharenko, N. A., & Balashova, I. V. (2020). Formation of an integrated system for monitoring the food security of the region. *Amazonia Investiga*, 9(25), 59-70.
- Kalfagianni, A., & Skordili, S. (Eds.). (2018). *Localizing global food: short food supply chains as responses to agri-food system challenges*. Routledge.
- Karthika, D. P., & Karthikeyan, P. (2016). Urbanization, food insecurity and agriculture—challenges for social sustainable development. *Problemy Ekorozwoju—Problems of Sustainable Development*, 12(1), 157-162.
- Laborde, D., Martin, W., & Vos, R. (2020). Poverty and food insecurity could grow dramatically as COVID-19 spreads. *International Food Policy Research Institute (IFPRI), Washington, DC*.
- Lambert, L. A., & Hashim, H. B. (2017). A century of Saudi-Qatari food insecurity: paradigmatic shifts in the geopolitics, economics and sustainability of Gulf states animal agriculture. *The Arab World Geographer*, 20(4), 261-281.
- Lezoche, M., Hernandez, J. E., Díaz, M. D. M. E. A., Panetto, H., & Kacprzyk, J. (2020). Agri-food 4.0: A survey of the supply chains and technologies for the future agriculture. *Computers in Industry*, 117, 103187.
- Muscio, A., & Sisto, R. (2020). Are agri-food systems really switching to a circular economy model? Implications for European research and innovation policy. *Sustainability*, 12(14), 5554.
- Perez-Escamilla, R., Gubert, M. B., Rogers, B., & Hromi-Fiedler, A. (2017). Food security measurement and governance: Assessment of the usefulness of diverse food insecurity indicators for policy makers. *Global Food Security*, 14, 96-104.
- Saint Ville, A., Po, J. Y. T., Sen, A., Bui, A., & Melgar-Quiñonez, H. (2019). Food security and the Food Insecurity Experience Scale (FIES): ensuring progress by 2030.
- Sommerville, M., Essex, J., & Le Billon, P. (2014). The ‘global food crisis’ and the geopolitics of food security. *Geopolitics*, 19(2), 239-265.
- Vanhaute, E. (2011). From famine to food crisis: what history can teach us about local and global subsistence crises. *The Journal of peasant studies*, 38(1), 47-65.
- Wieck, C., Rudloff, B., & Heucher, A. (2014). *Agri-investments and public spending in selected vulnerable countries—will they contribute to reduce food insecurity?* (No. 1548-2016-132466).
- Yakovenko, N., Rodionova, I., Ivanenko, I., Kireeva, N., & Sukhorukova, A. (2018). Export potential as the competitiveness indicator of the agri-food complex. *International Journal of Engineering and Technology (UAE)*, 7(4.38), 654-658.