Supplementary Materials

Supplementary Materials for: **Sustainable Futures**

Title:

Framing the Intractable – Comprehensive Success Factor Analysis for Grand Challenges

Volume: 2

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Organization method schematic

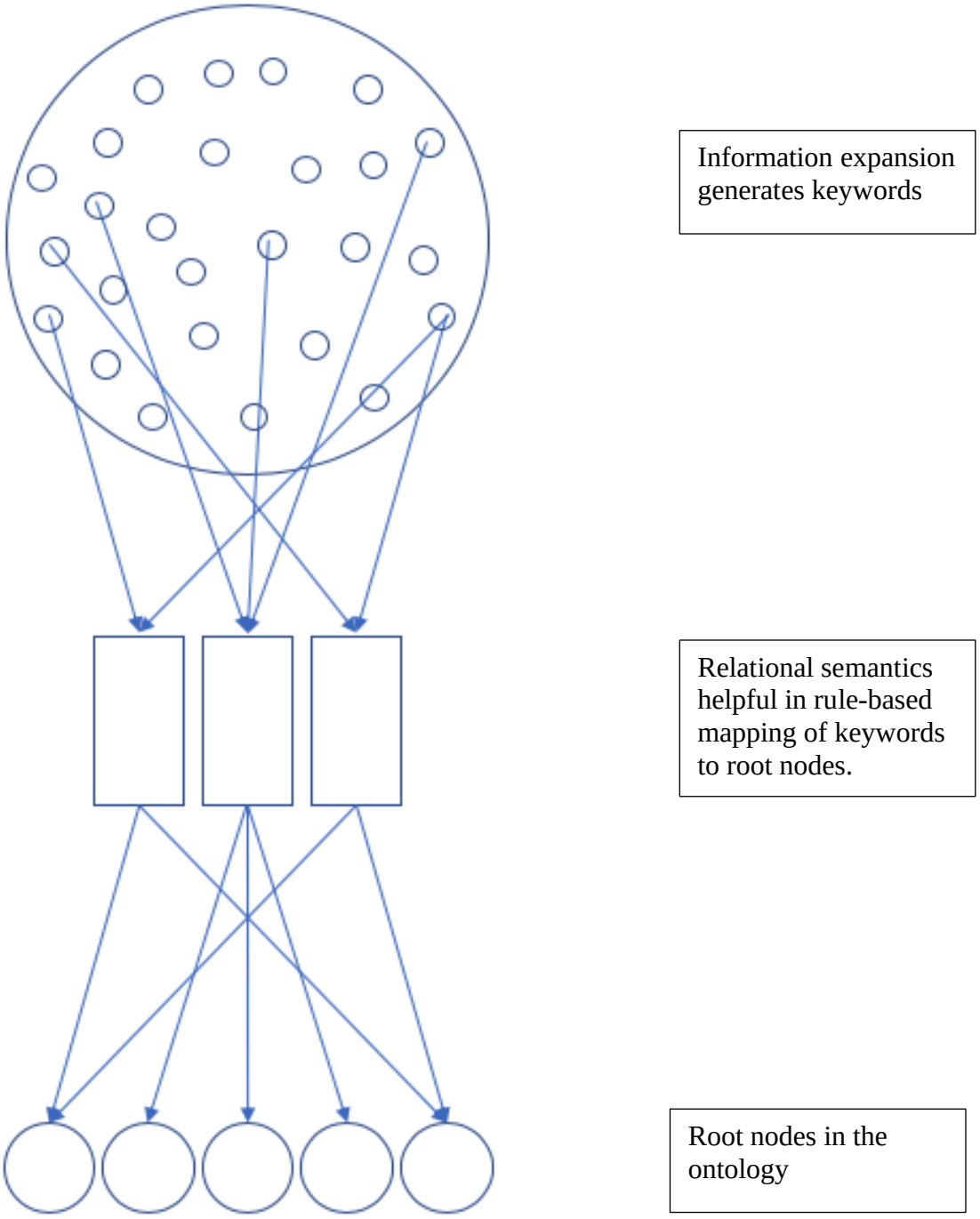


Fig. S1.

The use of the relations shown in Table S1 is schematically illustrated here. It provides principles for semantic organization and helps map “leaves” to “roots” as new keywords are mined from the web.

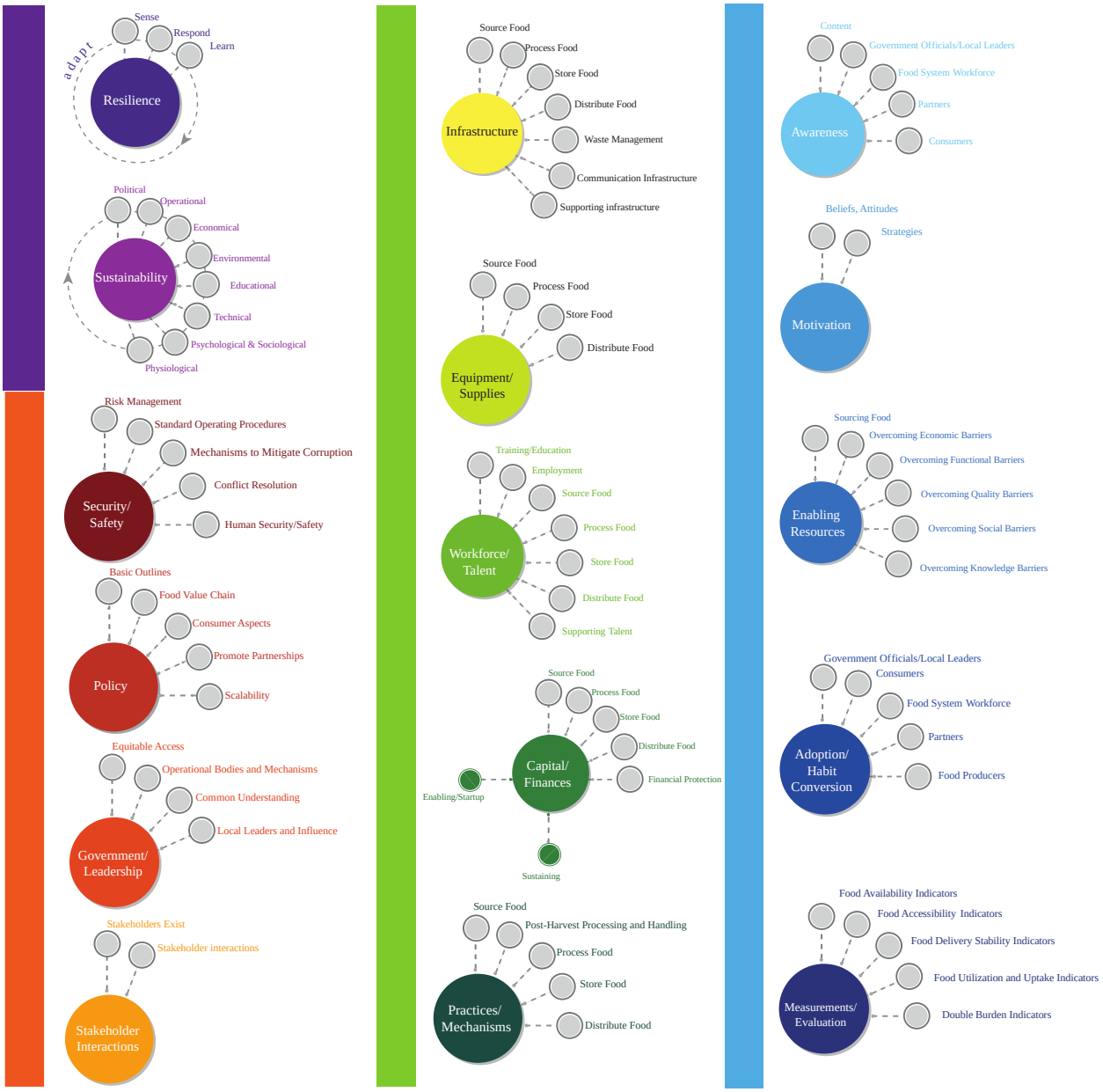


Fig. S2.

An overview of the major components of the success factor tree on food security illustrated in Table S3 below. This diagram is to be used to navigate the success factor tree.

Materials

Table S1.
Related words to the 16 root keywords that help us capture various sub-themes and contexts.

Sl. No.	Theme	Related words
1	Security/ Safety	Protection, Safety, Warrant, Surety, Guarantee, Safeguard, Ensure, Defense, Security measures, Security system, Peace, Precaution, Enforcement, Monitoring, Maintain, Government, Officials, Planning, Insure, Control, Support, Assistance, Threats, Indemnity, Proprietorship certificate, Government, security, Preservation, Integrity, Continuity, Economical, Actively protect, Commitment, Immune, Protective cover, Physical security, Information security,
2	Government/ Leadership	Governance, Administration, State, Authorities, Activity, Country, Local, Organization, Influence, Mandate, Nation, Lawmakers, Policies, Territory, System, Progressive, Support, Reform-minded, Aid, Plan, Agreed, Leaders, Proposal, Control, Responsible, Decision, Measures, Judicial system, Departments, Officials, System of rules, International, National, Regulation, Peace, International relations, Private sector, Economy, Provinces, Institutions, Policymakers, Municipal, Welfare, Executive branch, Foreign policy, Community, Corruption, Unite nation, Change management, Trade, Equality for everyone, Tax, Import, Money, Border dispute, Social welfare, Power, Position, Goal, Lead, Leading, Support, Unity, Followership, Commitment, Responsibility, Role, Strategy, Organization, Politics, Governance, Group decision making, Management, People, Task, Value, Charisma, Leaderless, Status, Body, Ability, Political, Administrator, Policy, Supported, Future, Allies, Opposition, Transition, Governing, Efforts, Supporting, Peace, Member, Respect, Social, Determination, Critical, Aim, Challenge, Participation, Focused, Influence, Skipper, Spearhead, Current, Social influence, Director, Elected, Relations, Vision, Cohesiveness, Expertise, Statesmanship, Decisiveness, Professionalism, Accountability, Dedication, Hierarchy, Competencies, Boldness, Direction, Courage, Fortitude, Involvement, Steadfastness, Pragmatism, Attitude, Inclusiveness, Alliances, Integrity, Continuity, Qualities, Excellence, Tenacity, Knowledge, Assertiveness, Credibility, Religious leader, Empathy, Shared leadership, Work ethic, Organizational communication
3	Policy	Administration, Adopt, Affairs, Affirmation, Agreements, Aimed, Appeasement, Changing, Code of conduct, Compliance, Consensual, Contract, Decision making, Directive, Economic, Economic policy, Economics, Education, Empowerment, Establish, Executive, Executive officer, Floating policy, Framework, Governance, Governing, Governments, Guideline, International, Jurisdiction, Law, Law enforcement, Legal, Legal entity, Legalization, Legislation, Local

Sl. No.	Theme	Related words
		government, Macroeconomics, Management, Mandate, Nonconformity, Norms, Orthodoxy, Philosophy, Plan of action, Pledge, Policies, Policy analysis, Policymakers, Political science, Private sector, Procedures, Prohibition, Protocols, Provisions, Public, Public law, Purchasing process, Rationale, Reasoning, Regulate, Regulations, Response, Rule, Rules of order, Social, Treaties
4	Stakeholder interactions	Shareholder Stockholder, Sectoral, Funder, Grassroots, Corporation, Management, Neutral, Participant, Partners, Organization, Provider, Practitioner, Respondent, Treasurer, Worker, Speaker, Institution, Actors, Informants, Funders, Private sector, Grouping, Subgroups, Investor, Consultant, Creditor, Representatives, Landholder, Entity, Parent, Public, Private-sector, Political, Cooperative, Public/private, Public-private, Socio-religious, Social-liberal, Non-governmental, Influencer, Hierarchy, Databank, Conservator, Bank, Banker, Monopolize, Institutional investors, Unsecured creditor, Financial institution, Labor union, Political system, Mortgage lender, Social group, Trade union
5	Infrastructure	Structure, Sewage, Water, Telecommunication, Transportation, Construction, Sanitation, Ecosystem, Economy, Facilities, Upgrading, Projects, Development, Installations, Infrastructural, Resources, Reconstruction, Communication system, Funding, Services, Modernization, Solutions, Logistics, Schools, Framework, Electricity, Irrigation, Transit, Store, Emergency services, Existing, Improvements, Supply, Providing, Businesses, Vital, Expand, Network, Urban, Operating, Stability, Environment, Maintaining, Technological, Integrated, Planning, Commercial, Develop, Capabilities, Agricultural, Industries, Management, Security, Amenities, Capacity, Access, Strengthen, Domestic, Water system, Gas system, Transportation system, Power system, Sewage system, Connectivity, Technologies, Scalability, Establishment, Systematization, Hierarchy, Airport, Flood, Earthquake, Functionalism, Public utility, Municipality, Cooperative, Distribution, Sustainability, Public-private partnership, Education system, Health care system, Law enforcement, Man-made structure, Operation research, Land use planning
6	Equipment/ Supplies	Gear, Apparatus, Technology, Materiel, Machinery, Installation, Setup, Instrumentation, Mechanical, Machine, Materials, Facilities, Maintenance, Components, Tools, Vehicles, Electronic equipment, Storage, Electrical, Equipped, Manufacturing, Operating, Installing, Services, Technologies, Portable, Handle, Units, Goods, Cleaning, Toolkit, Teaching-aid, Fixture, Trucks, Accessories, Hoses, Hydraulics, Fittings, Refrigeration, Motors, Forklifts, Available, Dehumidifying, Driers, Restock, Transportability, Garden tool, Screwdriver, Pump, Feed, Stock, Provision, Fuel, Water, Afford, Supplier, Procure, Power,

Sl. No.	Theme	Related words
		Refueling, Shortage, Availability, Inventory, Food, Production, Purchasing, Energy, Produce, Resources, Processing, Source, Deliver, Economics, Activity, Irrigation, Sustain, Bulk, Storage, Goods, Export, Capacity, Grain, Cost, Maintenance, Manufacturing, Shipping, Limited, Commercial, Operations, Domestic, Shortages, Facilities, Essential, Factories, Adequate, Market, Businesses, Product, Donate, Contribution, Quantity, Deliveries, Distribution, Rationing, Intake, Replenishment, Commodity, Sell, Transmission, Reserves, Law of supply and demand
7	Workforce/ Talent	Employment, Personnel, Manpower, Hands, Work force, Workers, Employees, Jobs, Staffing, Labor, Payroll, Enrollment, Employers, Wages, Sector, Productivity, Retirees, Manufacturing, Businesses, Graduates, Retraining, Agricultural, Establishment, Industry, Management, Salaried, Workplace, Incomes, Staff, Wage, Benefits, Contracting, Market, Resource, Costs, Professionals, People, Talent, Skilled, Welfare, Numbers, Registered, Education, Benefit, Healthcare, Savings, Insurance, Teachers, Human, Active, Potential, Strength, Apprentices, Outsourcing, Skilling, Competencies, Dependents, Nurses, Tradespeople, Types of companies, Gender, Brain drain, Succession planning, Staff member, Local government, Labor union, Private sector, Independent agency, Media organization, Street vendors, Political entity, Agricultural sector, Service sector, Industrial sector, Food production, Aptitude, Genius, Skill, Prowess, Expertise, Ability, Talented, Experience, Abilities, Strengths, Qualities, Passion, Enthusiasm, Expert, Professional, Achievement, Reputation, Accomplished, Promising, Valuable, Excellence, Besides, Successful, Worthy, Careers, Role, Unique, Job, Competent, Dexterity, Wisdom, Reliability, Adroitness, Skillful, Adept, Caliber, Knowledge, Be leader
8	Capital	Assets, Working capital, Stock, Principal, Operations, Endowment, Government, Part, Port, Local, Security, Liquid assets, Current assets, Principal sum, Endowment fund, Quick assets, Operating capital, Risk capital, Venture capital, Small capital, Seed money, Cash, Investment, Capitalization, Equity, Financing, Funds, Investments, Infrastructure, Finance, Financial, Resources, Credit, Asset, Invest, Operational, Money, Wealth, Property, Financiers, Tax, Shareholding, Business, Capitalist, Goods, Building, Venture, Construction, Transactions, Ownership, Fiscal, Heritage, Recurrent, Fortune, Fixed, Penalty, Deductions, Amortization
9	Practices/ Mechanisms	Training, Work, Pattern, Usage, Follow, Perform, Custom, Experience, Learn, Rule, Tradition, Activity, Engage, Pursue, Learning, Studying, Routine, Done, Doing, Way, Conduct, Commit, Utilization, Implementation, Manual, Execute, Review, Utilize, Knowledge, Preparation, Cognition, Lobbyism, Discipline, Decisions, Process, History, Policy, Field, Practitioners, Practitioner, Procedures, Approach, Tactic, Action, Behavior, Principle, Duties, Fieldwork, Methods, Practices, Methodology, Methodologies, Practical, Expertise, Situation,

Sl. No.	Theme	Related words
		Participation, Operation, System, Repetition, Guidance, Process, Mechanics, Framework, Processes, Method, Function, System, Structure, Arrangement, Procedure, Means, Action, Performance, Execution, Barrier, Workings, Philosophy, Mechanisms, Idea, Implementation, Initiate, Facilitate, Involves, Requires, Phase, Coordinate, External, Specific, Effective, Regulatory, Necessary, Flexible, Measures, Parameters, Essential, Pathway, Protocol, Interaction, Monitoring, Establishing, Evaluation, Provision, Approach, Action mechanism, Feedback loop, Safety
10	Awareness	Cognizant, Mindful, Unaware, Know, Sensitive, Understand, Perception, Cognitive, Alert, Heedful, Experience, Informed, Knowing, Understanding, Acknowledge, Obvious, Noting, Recognize, Realization, Attention, Sense, Knowledge, Watchful, Observant, Concerned, Subjectivity, Question, Prove, Circumstances, Extent, Situation, Thought, Unclear, Difficult, Admit, Interested, Necessarily, Ignored, Determined, Perceptive, Uninformed, Notice, Advise, Comprehension, Comprehend, Informative, Experiential, Informer, Perceiver, Ignorant, Acknowledging, Educate, Responsive, Current, Good, Eye opener, Sensitizing, Keep track, General knowledge
11	Motivation	Ambition, Motivating, Behavior, Need, Urge, Toughness, Determination, Desire, Empathy, Reason, Objective, Positive reinforcement, Teamwork, Belief, Urgency, Emotion, Psychology, Self-efficacy, Maslow's hierarchy of needs, Behaviorism, Condition, Morality, Ethics, Seriousness, Ability, Demonstrate, Abilities, Trigger, Strengths, Difficulty, Meaningful, Persistence, Creativity, Relevance, Perceived, Certainly, Qualities, Intentions, Theoretical construct, Indication, Consistent, Necessity, Implication, Achieve, Willingness, Understands, Irrational motive, Human activity, Ethical motive, Human action, Rational motive, Cognitive behavior, Propulsion, Inspiration, Rationale, Mindset, Purpose, Mentality, Enthusiasm, Attitude, Altruism, Cohesiveness, Challenge, Social psychology, Job satisfaction, Empowerment
12	Enablers	Empowerment, Government, Catalyst, Component, Facilitator, Tool, Element, Factor, Enabling, Activator, Spearhead, Trigger, Actuator, Actor, Launcher, Motivator, Initiator, Innovator, Instigator, Encourager, Integrator, Role, Changer, Orchestrator, Intermediary, Determinant, Conduit, Engager, Codependency, Implementer
13	Adoption	Acceptance, Alumni, Embrace, Naturalization, Approving, Appropriation, Adopt, Implementation, Introduce, Inclusion, Consent, Enactment, Permitting, Advocates, Welfare, Permit, Facilitate, Formal, Requirement, Establish, Policies, Promote, Follow, Appeal, Plan, Uptake, Adoptive, Adaption, Development, Enacting, Domestication, Adherence, Validation, Endorsed, Reception, Shift, Decision, Identity, Better

Sl. No.	Theme	Related words
14	Outcomes	Consequence, Result, Aftermath, Conclusion, Resultant, Effect, , Change, Aftereffect, Repercussion, Impact, Ending, Response, Decide, Decisions, Situation, Scenario, Effectiveness, Success, Accomplishment, Influence, Materialization, Indication, Determined, Possibility, Prove, Consequent, Inevitable, Consequently, Explanation, Satisfied, Proceed, Consider, Determine, Determining, Reasons, Likelihood, Timing, Credible, Meaningful, Predict, Causal, Infer, Effective, Reelection, Resolve, Prognosis, Consequences, Implications, Way, Findings, Progress, Eventual, Bring about, Goal, Performance, Objectives, Recommendations
15	Sustainability	Ecology, Sustainable development, Climate change, Energy, Economics, Biodiversity, Natural environment, Ecosystem services, Society, Viability, Ethical consumerism, Lifestyle, Empowerment, Sustainable agriculture, Quality of life, Social sustainability, Productivity, Utilization, Resources, Law, Food, Governance, Urban planning, Innovation, Sustainable cities, Renewable energy, Competitiveness, Closed system, Transparency, Conservation, Environmental, Efficiency, Population, Technology, Diversification, Forests, Policymaker, Macroeconomic, Advancement, Strategies, Accountability, Water, Improvement, Organizational, Institutional, Management, Stability, Capacity, Prosperity, Long-term, Fisheries, Probability, Tolerance, Sustainability reporting, Expertise, Skill, Availability, Suitability, Limits to growth, Population growth, Longevity, Aquaculture, Overfishing, Life cycle assessment, Sustainable food, Material flow analysis, Industrial metabolism, Industrial ecology, Local exchange trading systems, Job creation, Market failure, Political corruption
16	Resilience	Elasticity, Rebound, Recoil, Vitality, Dynamism, Fragility, Vigor, Vulnerability, Adaptability, Strength, Tenacity, Resourcefulness, Decisiveness, Cohesiveness, Durability, Steadiness, Repercussion, Deformation, Spring, Leap, Foresight, Sophistication, Urgency, Demonstrates, Teamwork, Enhances, Enduring, Sustaining, Vigor, Alertness, Deterioration, Fortitude, Adversity, Robustness, Weathering, Recovery, Solidarity, Dedication, Consistency, Unpredictability, Stimulus, Perseverance, Innovativeness, Adaptiveness

Table S2.

Relations used to link components of the ontology. The table explains inheritance for relational words by illustrating it for the 'security/safety' root node and correlates them to utilization in the success factor tree on food security.

Legend	
Blue	Related words from Table 2
Green	Relations from table below

Relation	***Verb examples from Tree***	***Illustration for the root Security / Safety***	***Success factor tree Line No.***	***Representation in the tree***
Is a		Security / Safety is a pattern element	A	One of the root nodes for the CSFA process
Belongs to / Is a type of	Identified as, segregations,	Risk Management is a type of Security / Safety	2	Shown as a branch
Is a subset of / Is a part of	Part, contribution, share, majority, ratio	Financial security is a subset of risk management / Financial security is a part of risk management	4	Shown as a sub-branch
Is a superset of / Is made of /Contains / Has	Integration, collection of, includes, made, constitutes	Security / Safety contains risk management, standards, quality control, corruption, conflict resolution, human security	2, 12, 18, 25, 28	Main branches of Security / security chosen from words in Table 1
Is a process / mechanism	Processing, storing, distribution, consumption, delivery, spoiling, training, hunting, gathering, selling,	Mechanisms for risk management exist	3...17	For risk management

Relation	***Verb examples from Tree***	***Illustration for the root Security / Safety***	***Success factor tree Line No.***	***Representation in the tree***
	articulate, contemplate			
Is an event	Purchasing, crises, disasters interventions, epidemics	Security breach /intrusion is an event	-	Not considered in the tree but would play a role in data management
Is a subevent / sub-process	Phases	Monitoring is a sub-process of risk management	6	Shown as a sub-branch under risk management
Is a prerequisite / Is dependent on	Prepare, precautionary,	Risk assessment is a prerequisite for risk management	3	Shown as a sub-branch under risk management
Leads to /Causes /Output	Drives, produces, provides, affects, yields, meets, achieves, proves	Standards and Quality control measures in place lead to operational risk reduction	12	Shown as sub-branches of operational risk mechanisms
Used to / Used for	Utilize, implement	Practice Guideline is used for setting Standards	-	Not present in current example tree
Capable of	Enable, empower	Stakeholders are capable of conflict resolution	26	Assumption in line 26
At (location / lens)	Country, region, household, individual, coastal	Safety / Security is observed at all micro and macro levels of the country	-	Inherent requirement for the root node
Created by / Derived from	Sourced, obtained, generated, derived,	Corruption can be overcome by creating stakeholder accountability	23	Indirect relation shown by connecting branches

Relation	***Verb examples from Tree***	***Illustration for the root Security / Safety***	***Success factor tree Line No.***	***Representation in the tree***
	constructed, originated, started			
Is similar to	Like	Retrospective Study is similar to Review	-	Not present in current example tree
Is associated with / Is related to	Relevant,	Communication is related to Communication Systems	27	Not present in current example tree
Is the same as		Data Privacy is the same as Information Security	-	Not considered in the tree but would play a role in data management
Is different from	Greater, than	Quality control is different from Conflict Resolution	12, 25	Shown as separate branches
Is contextual to	Which, with regard to, reliant	Hygiene is contextual to Food Safety	14	Shown as a sub-branch to attaining food safety
Is a symbol of	Shows	Monopoly is a symbol of lack of market competition	7	
Influences	Augment, change, maintain, accommodate, facilitate, increase, decrease, spread, prevent, strengthen, mitigate, expand,	Human security influences Security / Safety	28	Shown as a branch under Security / Safety

Relation	***Verb examples from Tree***	***Illustration for the root Security / Safety***	***Success factor tree Line No.***	***Representation in the tree***
	strengthen, adjust, adverse			
Receives action	Implement, enforce	Corruption can be overcome by implementing Public Policy with disciplinary action against corruption	20	Shown as a sub-branch to corruption
Is motivated by	motivated, consider, interest,	Insurance is motivated by human security	29	Shown as a sub-branch to human security
Is governed by / controlled by	Managed, follow, framing, according to, compliance	Regulations govern food safety if exist and followed	13	Shown as a sub-branch
Interactions	Intra, interpersonal, engage, address, align with, avoid, circumvent, overcome	Corruption can be avoided or overcome	25	Assumption in line 25

Table S3.

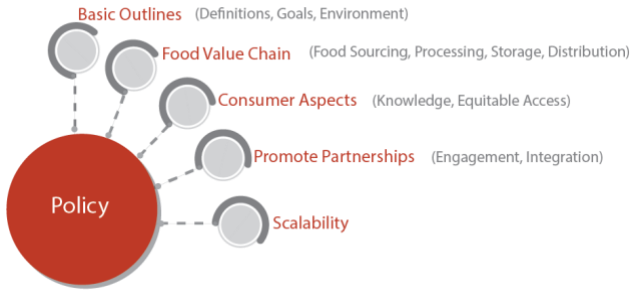
The success factor tree (pages 13-81) is an illustration of the output of the CSFA method when applied to the grand challenge of providing food security to a nation. Figure S2 contains an overview of its major components and should be used to navigate the tree.

A. Security/Safety

1	**Measures to ensure safety within the food value chain exists**
2	Risk management mechanisms to protect food value chain segments exist
3	Mechanisms to assess risks exist
4	Mechanisms to protect various stakeholders from financial risks exist
5	Mechanisms to manage strategic risks exist
6	Mechanisms to monitor and manage market competition and market power including foreign markets exist
7	Food value chain segments are free from any monopolizing entity
8	Mechanisms to manage economies of scale exist
9	Mechanisms to support business continuity plans exist
10	Mechanisms to develop and maintain infrastructure and critical systems exist
11	Mechanisms to keep up with the economic cycle and customer demand in the food and nutrition domain exist
12	Mechanisms to manage operational risks exist (E.g., cleanliness, hygiene, regulations, occupational safety
13	Standard operating procedures and quality measures are maintained throughout the food value chain

14 Regulatory measures for food safety exist and are followed
15 Regulatory measures include quarantine, cleanliness, hygiene measures for safe handling of food
16 Quality and reliability measures exist and are followed
17 Standard operating procedures for handling perishables exist and are followed
18 The utilization of standardized and safe equipment and tools are promoted
19 Corruption, if present, can be circumvented
20 Mechanisms are in place to take disciplinary action against corruption within the government
21 Policies on appropriate disciplinary measures against corruption exist
22 Economic barriers with regard to creating availability of adequate nutritious food can be overcome
23 Possibility of corruption and fraud can be circumvented
24 All entities in the food delivery system that utilize funds are held accountable for it
25 Mechanisms to facilitate conflict resolution where required exist
26 Entities to take responsibility for peaceful negotiation among various stakeholders exist
27 Communication mechanisms to facilitate peace keeping exist
28 Mechanisms to facilitate human security against risks/hazards in the food value chain exist
29 Insurance can be availed by stakeholders in the food value chain

B. Policy



1 **The governing bodies of the country have established the importance of equitable access to food security through structured policies**

2 Structured policies have been developed and implemented to create food security
3 Policies that provide the broad basis and outlines of food security and nutrition exist
4 Policies clearly define what constitutes food security
5 Policies establish national goals for provision of food security
6 Policies on measures of nutrition intake and food security exist
7 Policies on protection of forests and wildlife from impacts of hunting exist
8 Policies on fishing and protection of endangered species exist
9 Policies on protecting the environment from/for hunting exist
10 Policies on protecting water bodies and aquatic ecosystems from impacts of excessive fishing exist
11 Policies on climate adaptation and mitigation exist
12 Policies to guide government bodies and local leaders to help create food security for all households exist
13 Policies on emergency measures and Social Safety Nets for protection against food crises exist
14 Policies on various aspects related to food security and nutrition value chain exist
15 Policies on minimum wages for food system workforce exist
16 Policies on provision of infrastructure to facilitate food security exist (E.g., transportation facility, storage facilities, markets)
17 Policies on making good quality, nutritious food affordable exist
18 Policies that articulate expiration periods for various foods exist
19 Policies on subsidies offered within the food supply chain exist
20 Policies on ownership/rights to manage farmlands exist
21 Policies on access to land for women exist
22 Policies on rights and management of shared communal lands exist
23 Policies on improvement of techniques and technology used in food supply chain (segments) exist
24 Policies on assessment methods utilized to maintain quality of food produced exist
25 Supportive policies on creating access to resources for agriculture exist
26 Policies on access to water resources for agriculture exist
27 Policies on access to water for food processing purposes exist
28 Policies on training farmers/food producers exist
29 Policies on energy and access to electricity for food producers, processors and distributors exist
30 Policies on strengthening the agricultural sector exist

31 Policies on inter-regional and intra-regional trade of food exists
32 Policies on import/export of food exist
33 Policies on receiving aid-based food exist
34 Policies on market creation exist
35 Policies on food supply chain workforce training services and access to extension exist (E.g., how to obtain adequate funding, delivery and utilization of technology, improvement of crop growth)
36 Policies that connect research on agricultural development and training services/access to extension exist
37 Policies on degrees/certifications required to prove qualification for specific positions within the food system workforce exist
38 Policies on training for food sourcing exists (E.g., training programs for farmers and agriculturists)
39 Policies on training and support for local talent to manage their own scalable food businesses exist (E.g., production and distribution of fresh produce, production and distribution of processed food)
40 Policies on appropriate disciplinary measures against corruption exist
41 Policies that encapsulate consumer aspects exist
42 Policies on provision of equitable access to nutritious, adequate and diverse food for all residents of the nation exists (E.g., different socio-economic backgrounds, religions, customers that have different abilities and needs)
43 Policies on raising awareness and sensitizing population about food security and nutrition intake exist
44 Policies on nutrition standards required by different categories of people during different stages of their lifetime exist
45 Policies to promote partnerships exist
46 Policies promote private sector engagement in food delivery system
47 Policies promote engagement of non-profit entities to facilitate food security
48 Policies promote partnerships with other organizations within the country
49 Policies allow international partnerships (E.g., Funding agencies, non-profit organizations, international food-aid)
50 Policies promote partnerships between food supply chain segments (E.g., producers, processors, transporters, wholesalers, retailers, consumers)
51 Policies promote integration of institutions/sectors within the country (E.g., healthcare, schools, food supply) to deliver food security
52 Policies are scalable and flexible

53 Policies are flexible to allow and incorporate development/progress in the agriculture/food sector (E.g., technological development, development in techniques implemented)
54 Policies framed are economically operational
55 Policies framed are functionally operational
56 Policies are protected from misuse
57 Acceptable disciplinary measures are in place for policy misuse
58 Policies are regularly updated for long-term sustenance

C. Government/Leadership

1 **Country has government and leadership support to strengthen food systems to deliver adequate, nutritious food for all households**
2 Government is committed to creating equitable access to food security
3 Government understands and supports the need for access to food security
4 Funds are allocated for creating long-term access to adequate, healthy, nutritious food to create a positive health impact in the country
5 Government drives towards provision of equal opportunity for all

6 Government works towards harmonization of regional standards to facilitate fair trade practices of regional farmers/producers
7 Government supports development of food technology
8 Government and policy makers have an ambitious, hopeful, committed attitude
9 Government is open to utilizing opportunities for private sector engagement to achieve goals related to food delivery
10 Government has means to assess quality of food provided
11 Operational bodies and mechanisms to enforce various nutrition and food security policies exist
12 Operational body and mechanism for evaluation of outcomes of increasing consumption of adequate nutritious food exist
13 Operational body and mechanism for development of food delivery strategies exist
14 Operational body and mechanism for development of food security investment plans exist
15 Entities responsible for developing and distributing technology to support agriculture exist
16 Operational body and mechanism to spread food and nutrition information exist
17 Operational body and mechanism for distribution of food supplements exist
18 Operational body and mechanism for distribution of nutrition services exist (nutrition counselling)
19 Operational body and mechanism for inspection of food at different stages in the supply chain exist
20 Operational body and mechanism for regulation of food delivery systems exist
21 Operational body and mechanism to measure outcomes of the nutrition and food security objectives set by the government exist
22 Operational body and mechanism for training food supply chain workforce exist
23 Operational and just judicial system exists to apply laws for conflict/dispute resolution
24 Policies and laws on provision of nutrition and food security are adhered to across all political levels (National, Regional, Local)
25 All political sectors, local leaders and influencers of change are made aware of policies related to nutrition and food security
26 Relevant representation participates in the regulation and policy framing process
27 Representation includes members from the food sector (E.g., experts in the field of agriculture, management, food processing industry, nutrition)
28 Government, local leaders and influencers of change are supportive and influential in driving awareness and implementation of policies

29 Different government and non-government bodies at national, regional and local levels are in agreement with policies and work towards its implementation

30 Checks are in place to make sure policies and regulations are not misused

31 Corruption, if present, can be circumvented

32 Mechanisms are in place to take disciplinary action against corruption

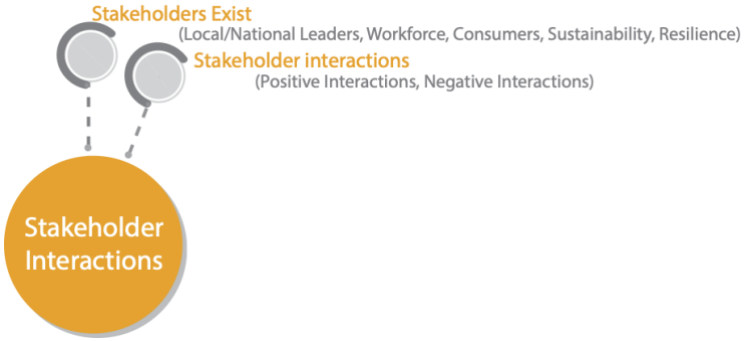
33 Local leaders (E.g., govt. appointed leaders, religious bodies, influencers of change) are committed to creating equitable access to food security

34 Local leaders care about the welfare of the community

35 Local leaders are capable of conflict management within their regions

36 Local leaders follow policies set forth by the government and drive its implementation

D. Stakeholder Interactions



1 **Stakeholders that perform various roles that are required within the food and nutrition system exist, are operational, and effective**

2 Stakeholders that hold **local and national leadership positions** with decision making and influencing capabilities exist and effectively contribute to the system (E.g., government, local leaders, influencers of change)

3 Roles/duties and authorities of each stakeholder are described through a formal/informal structure

4 Required stakeholders within the government exist, are operational, and effective (E.g., personnel in charge of policy development, finance, environment control and management, quality, inspection, trade)

5 Local influencers exist, are operational, and effective (E.g., local leadership, cultural leaders/organizations, religious leaders/organizations, labor union leaders, community support groups)

6 Local and national resource managers exist and effectively contribute to the system (E.g., water manager, cultivation manager, fishery manager, hunting/game manager)

7 Leaders are held accountable (E.g., processes carried out/results of evaluations performed are transparent to the public)

8 Entities that hold leaders accountable where needed exist, are operational, and effective

9 Leaders are held responsible for effective management of resources within their domain (E.g., knowledge management, opportunity creation, responsibility delegation)

10 Leaders are representative of their domain (E.g., while interacting with external entities)

11 Leaders have the ability to initiate change

12 Opinions of leaders that drive decisions are influenced by favorable change agents

13

14 **Workforce** responsible for the efficient functioning of the food and nutrition system exists and effectively contributes to the system

15 Workforce that perform **critical roles** within the food value chain exists, is operational, and effective

16 Food producers exist and produce various types of unprocessed food (E.g., subsistence and commercial farmers, aqua-culturists, pastoral farmers, subsistence farmers)

Food production workers with appropriate skills are available where, when, and in numbers required (e.g, farm help)

17 Stakeholders that assume post-harvest processing and storage responsibilities exist, are operational, and effective

18 Food preservation functions are undertaken by existing operational entities

19 Food and beverage packaging are performed by existing operational entities

20 Stakeholders that undertake food distribution responsibilities exist, are operational, and effective

21 Food transportation/logistics functions are assumed by existing operational entities
22 Vendors for food distribution at outlets (E.g., retail, wholesale, markets, restaurants) exist and are functional
23 Workforce to **support food value chain activities** exists and actively contributes to the system
24 Stakeholders that provide access to supplies, equipment and infrastructure to the food and nutrition system exist, are operational, and effective (E.g., Suppliers of farm inputs like seed, feed, equipment, tools, chemicals, fertilizers)
25 Stakeholders that provide/permit access to critical resources exist (E.g., water, electricity, land)
26 Entities that hold specific expertise valuable to food value chain stakeholders exist, are operational, and effective (E.g., climate experts, veterinarians, health professionals, nutritionist)
27 Research focused entities that enable improvement within the food and nutrition system exist, are operational, and effective (E.g., technology innovation researchers, environment and climate researchers, sociologists and behavioral researchers)
28 Existing operational partners that can enhance the food and nutrition delivery system are engaged where required (E.g., private sector partners, NGOs)
29 Stakeholders that enable economic access within the food value chain exist, are operational, and effective (E.g., government, banks, credit agents, funding agencies, donors, microfinance organizations)
30
31 Stakeholders that **drive demand for food** exist, are operational, and effective
32 Stakeholders that spread awareness among the population to educate them exist, are operational, and effective
33 Stakeholders that promote information on food and nutrition at a population level (national/regional/local) exist, are operational, and effective (E.g., telecommunication and marketing entities)
34 Stakeholders that promote information on food and nutrition at community/household level exist, are operational, and effective (E.g., schools)
35 Stakeholders that advocate food and nutrition choices at an individual level exist, are operational, and effective (E.g., nutrition/diet experts, medical practitioners)

Organizations/entities that provide relevant information about food and nutrition to specific food value chain entities exist, are operational, and effective (E.g., training organizations, health organizations, research organizations)

Stakeholders that consume various kinds of food options exist and adopt a nutritious diet as per their needs)

Consumers that drive demand for food exist and consume a nutritious diet as per their habits

Entities that influence adoption of new habits and behaviors in favor of consuming a balanced nutritious diet exist, are operational, and effective

Consumers that are quick to adopt new behaviors (i.e., early adopters) in favor of consuming nutritious food exist and drive demand, often as advocates, for broader, more nutritious food varieties

Consumers that delay adoption (i.e., early majority) of new behaviors of consuming nutritious food (e.g, due to behavior or attitude) can be influenced to adopt new favorable behaviors

Consumers who delay adoption due to a barrier (skills, wealth, access, time) exist (i.e., late majority) and can be assisted to adopt new behaviors in favor of consuming nutritious food

Consumers who refrain from adoption of nutritious foods can be motivated to adopt favorable behaviors

Stakeholders that maintain **sustainability and resilience** in the system exist, are operational, and effective

Stakeholders that reduce liabilities/manage risks within the food value chain exist, are operational, and effective (E.g., insurance providers)

Stakeholders responsible for training individuals for employment within the food value chain exist, are operational, and effective

Stakeholders responsible for employing individuals within the food value chain exist, are operational, and effective

Local emergency response personnel exist, are operational, and effective (E.g., police, ambulance, fire brigade)

National emergency response personnel exist, are operational, and effective (E.g., relief groups, external aid)

Stakeholders that drive infrastructure growth and improvement exist, are operational, and effective

Entities that design expansion of infrastructure exist, are operational, and effective (E.g., infrastructure assessment, planning, development, management)

Entities that construct/execute planned infrastructure expansion exist, are operational, and effective (E.g., engineers, construction workers)

Entities that maintain the efficient functioning of infrastructure exist, are operational, and effective (E.g., managers, maintenance, employees)

Interactions between stakeholders facilitate food security and access to nutrition to all people within the country

Positive interactions are promoted to enable sustainability within the food and nutrition system

Positive interactions of various forms result in improved food and nutrition outcomes at the national, regional, community, household and individual levels

Interactions involving **exchange** facilitate food security and access to nutrition

Stakeholders agree to the value of resources exchanged (perceived value of tangible/intangible resource exchanged meets expectations of stakeholders)

Interactions involving exchange of goods/services for money are deemed fair by participating stakeholders (E.g., purchases within the food system, wages for employment, financial assistance provided/received)

Interactions involving exchange/sharing of capabilities are perceived as valuable and fair by involved stakeholders (E.g., training provided/acquired, sharing of assets)

Interactions involving exchange of information support improvement within the food system (E.g., education to improve food habits and nutrition of population, research insight that improves crop yield and farming practices, measurement and evaluation results that can improve government decisions)

Interactions involving the facilitation of connections between stakeholders support improvement within the food system (E.g., networking, references)

Interactions involving **competition** enable food security and improved nutrition outcomes of the country

66 Interactions involving competition facilitate innovation that drives improvement in the food system (E.g., various barriers to food and nutrition access and delivery are overcome through competition to serve different target populations)

67 Competition follows acceptable rules of conduct

68 Rules/ laws constructively guide/support competition (e.g., IP policy, antitrust, conflict of interest, non-compete agreements)

69 Interactions involving **cooperation** facilitate food security and access to nutrition

70 All involved stakeholders at international, national, regional, community, household and individual levels cooperate and work towards the common goal of providing food security and access to nutrition in the country

71 Involved external/international stakeholders (E.g., international corporations, NGOs) that support the country's food requirements do so in a way that strengthens the country's food and nutrition system

72 Government is supportive to strengthen country's food and nutrition system

73 Government consults stakeholders involved in decision making related to the food and nutrition system

74 Government pursues fair management of taxes in the country to support the food and nutrition system

75 Policy makers create trade laws that promote constructive market competition (E.g., laws that prevent monopoly, laws that protect consumers, laws that promote economic opportunity)

76 Food value chain stakeholders cooperate with the government/leadership and with each other to attain the broader goal of food security within the country

77 Consumers make informed choices related to consuming adequate nutritious food available to them

78 Consumers are provided access to desired nutritious food at acceptable prices

79 Household finance keeper(s) are willing to utilize required portion of household income towards purchase of available nutritious food

80 Interactions involving **influence** produce improved food security and nutrition outcomes for the country

81 Influential interactions that set norms across the country improve food security and nutrition outcomes among the population

82 Interactions involving international entities that influence norms across the country improve food security within the country

83 Efforts of international entities align with national goals and objectives to improve food security and nutrition within country

84 Country is capable of making decisions related to engaging with international entities

85 National/regional/local entities (E.g., national/local government, influencers of change) influence norms across the country to improve food security within the country

86 National/regional/local entities work towards the greater good of the country's population without internal biases

87 Political influence improves food security within the country

88 Social influence improves food security within the country

89 Cultural influence improves food security within the country

90 Influential interactions that set norms within a community are aimed at improving food security and nutrition outcomes of the community (E.g., behavior change within a community)

91 International entities (E.g., research groups, NGOs) that influence norms in communities result in improved food security and nutrition outcomes of the communities

92 National/regional entities that influence communities result in improved food security and nutrition outcomes of the communities

93 Food and nutrition outcomes influence national/regional decision making (informational influence)

94 Individuals/entities that take on local leadership roles within a community positively influence food security and nutrition outcomes of the community

95 Social interactions within the community promote adoption and conversion to habits / practices in favor of improved food security and nutrition outcomes

Influential interactions that set norms within a household are aimed at improving consumption of nutritious food among household members (E.g., purchase and consumption of nutritious food in the household)

Interpersonal/social and peer interactions influence individuals to improve consumption of nutritious food (E.g., awareness and motivation to maintain good health through consumption of nutritious food)

Interactions that primarily influence individuals from specific age or social groups (E.g., peer pressure among youth, conformity to household norms among children, conformity to social norms among adults) result in improved consumption of nutritious food

Environmental influencing factors (E.g., availability of desired, adequate food) support improved consumption of nutritious food among community members

Negative interactions are reconciled to facilitate resilience within the food and nutrition system

Interactions that can lead to/involve conflict/disputes are managed so as to maintain resilience within the food and nutrition system

Interactions that **may lead to conflict** are identified and managed to avoid conflict when and where possible

Monitoring and regulative mechanisms exist at international, national, regional, community and household levels to avoid effects of negative external entities on the food system

Mechanisms to prevent interactions based on exchange among food system stakeholders from developing into conflict exist (E.g., through trade policies)

Mechanisms to prevent competitive interactions among food system stakeholders from developing into conflict exist (E.g., through acceptable rules of conduct)

Mechanisms to peacefully address entities that fail to cooperate exist (E.g., negotiation/accommodation to prevent conflict/dispute, existence of arbiters)

Mechanisms to limit the effects of entities that negatively influence the food system exist (E.g., leadership influence/ change mechanisms)

109 Interactions that **result in conflicts/disputes** lead to acceptable reconciliation (compromise, collaboration, accommodation, avoidance, defeat) processes

110 Mechanisms/strategies/processes to resolve conflicts/disputes involving interactions (E.g., trade, competition, coercion, invasion) with international entities exist (E.g., international conflict resolution mechanisms)

111 Mechanisms/strategies/processes to resolve conflicts/disputes among internal political entities exist

112 Mechanisms to resolve conflicts/disputes involving interactions among food value chain entities and/or entities supporting the food value chain exist (E.g., through an established judiciary system)

113 Mechanisms to resolve conflicts/disputes pertaining to food security among/within communities exist (E.g., communal councils)

114 Mechanisms to resolve conflicts/disputes pertaining to food security/the food system at the household/individual level exist

E. Infrastructure

1 **Infrastructure to support effective delivery of food security through an operational food value-chain is in place or can be developed**

2 Infrastructure is developed through strategic planning

3 Country has infrastructure to support the **sourcing of sufficient food** to provide adequate nutrition to all the people of the country

4 Country has or can create infrastructure to support the sourcing of food through regional production

5 Regions that produce food that is adequate or in surplus of nutrition needs of people in the region have or can create infrastructure to perform effective farming practices

6 Communities that contribute to the food produced in the region generate adequate or yield in excess of household requirement (food produced - consumption)

7 Farming at the individual/community level in a region produces excess of individual household requirements

8 Infrastructure to support individuals/communities who perform arable farming (growing of crops) exist or can be developed

9 Farmers have or can access infrastructure required for arable farming (E.g., tractors, latest technologies in agriculture)

10 Farmers have or can access operational infrastructure to perform post-harvest processing

11 Infrastructure to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exist or can be developed

12 Farmers have or can develop means to hold livestock (E.g., pens, sheds, coops)

13 Farmers have or can develop infrastructure to enable harvest and post-harvest processing procedures

14 Infrastructure to support individuals/communities who perform fishing and aquaculture (rearing of fish) exist or can be developed

15 Fishermen have effective infrastructure to perform fishing

16 Fishermen have safe and well-built floating vessels to allow them to travel to locations that can yield better quantity/quality of fish (E.g., boats)

17 Fishermen who migrate to/from coastal communities have adequate access to fisheries

18 Farmers have effective infrastructure to perform aquaculture

19 Farmers have effective infrastructure to breed fish in freshwater conditions
20 Farmers have access to required equipment and machinery
21 Farmers have access to markets to sell their goods
22 Farmers have techniques and required equipment/infrastructure to process food grown (E.g., cold storage facility)
23 Farmers use effective techniques to perform mariculture (growing or breeding in marine water/brackish water)
24 Farmers have access to required equipment and machinery
25 Farmers have access to international and local markets to sell their goods
26 Farmers have techniques and required equipment/infrastructure to process food grown (E.g., drying seaweed before selling)
27
28 Infrastructure to support Country when it sources food and supplements to produce food through **external aid to accommodate shortage**, if any, in production exists
29 Country can import food/request for food-aid to accommodate shortage within the country
30 Country has or can develop infrastructural means to receive imported food (E.g., seaports/airports)
31 Country has or can develop infrastructure to store imported food where required
32 Country has or can develop infrastructure to process imported food where required
33 Country has or can develop infrastructure to distribute imported food where required
34
35 Effective infrastructural means to **process food** produced are in place or can be developed where required
36 Commercial food processing plants for large scale primary, secondary or tertiary food processing exist or can be developed where required
37 Food processing facilities are supported by robust infrastructure
38 Infrastructure facilities for processing grains exist/can be developed where needed

39 Infrastructure facilities for processing meat and poultry exist/can be developed where needed
40 Infrastructure facilities for processing fruits and vegetables exist/can be developed where needed
41 Infrastructure facilities for processing dairy exist/can be developed where needed
42 Infrastructure facilities for processing fisheries exist/can be developed where needed (E.g., salting)
43 Infrastructure facilities for processing and packaging certain foods/drinks exist/can be developed where needed
44 Infrastructure facilities to ensure effective functioning of food processing units exist/can be developed
45 Small-scale food processing units for distribution of produce within the community exist/can be developed
46 Unit has access to food distribution means
47
48 Regional facilities (E.g., farms, food processing units, food distributors) have or can develop effective means to **store food**
49 Food storing facilities are supported by robust infrastructure (E.g., utilization of safe private/underutilized storage facilities)
50 Storing facilities for farm produce exist where required
51 Infrastructure facilities for storing grains exist where needed (E.g., grain storage facilities have conditions that are moisture free)
52 Infrastructure facilities for storing meat and poultry exist where needed
53 Infrastructure facilities for storing fruits and vegetables exist where needed
54 Infrastructure facilities for storing dairy exist where needed (E.g., cold storage facilities)
55 Infrastructure facilities for storing fish exist where needed
56 Storing facilities for processed food exist where required
57 Small-scale processing units are informed about effective storing mechanisms
58 Infrastructure facilities for storing packaged food/drink exist where needed
59
60 Effective means to **distribute food** produced are in place or can be developed
61 Food distribution processes are supported by robust infrastructure
62 Physical obstacles to food security imposed by local terrain can be overcome by creating access

- Infrastructure exists/can be developed to facilitate multiple modes of transportation
  - Operational transportation modes exist and enable access between markets/food and consumers
    - The modes of transport are safe
    - The modes of transport are trusted by families/communities/food distributors
    - The modes of transport are efficient
      - Speed of food delivery allows preservation of quality of food (i.e. when the food reaches the consumer, it is in consumable form)
    - The modes of transport are reliable
    - Transportation cost is affordable
  - The transportation route is free from any monopolizing entity
  - Obstructions to the safe passage of commuters/food can be overcome
  - Alternative means to deliver food are sought where transportation is not feasible (E.g., encouraging people in remote villages to grow their own produce)
- Markets and/or retail shops to facilitate distribution of food exist or can be set up
- Distribution networks facilitate access to markets for processed food as well as fresh produce
  - Efficient distribution mechanisms exist for fresh produce
  - Efficient distribution mechanisms exist for distribution of processed food

Operational infrastructure to manage waste generated by the food value system exists

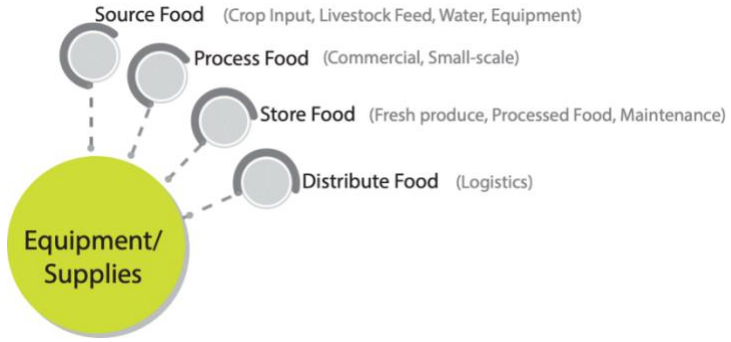
Infrastructure to **facilitate communication** between stakeholders exists

- Effective channels of communication exist or can be developed to spread awareness among populations (E.g., mass media channels like radio, television, interpersonal channels like nutritionist, local sellers, markets, institutional channels like schools, government)
  - Acceptable and robust communication channels are identified or developed
    - Existing institutions and/or private sector channels are leveraged to spread awareness among the masses (E.g., trusted private-sector entities that are popular among communities)

85 Channels to spread awareness that have high impact and are reliable are identified
86 Drivers of awareness acknowledge the need for awareness among the population about nutrition and food security
87 Channel drivers formalize intent to raise awareness about nutrition and food security by setting outcome-based objectives and developing strategies
88 Channels to spread awareness are secure and stable
89 Channels to spread awareness are supported by sufficient resources
90 Channels to spread awareness are equipped with material resources
91 Channels to spread awareness are equipped with technological resources
92 Channels to spread awareness are equipped with human resources
93 Channels to spread awareness are financially secure
94 Channels to spread awareness operate legally in compliance with existing laws and regulations
95 Channel drivers are trusted by the government and other stakeholders
96 Channel drivers and the communication channels utilized are trusted by the population
97 Communication systems utilized are persistent and secure for long-term purposes
98 Involved stakeholders trust communication channels used
99 Different and multiple channels of communication are utilized to raise awareness among different target populations
100 A variety of effective channels of communication exist
101 Communication channels and systems are resilient to environmental and political change
102 Awareness can be spread in a socially acceptable way
103 Awareness can be raised among vulnerable/high risk target populations
104
105 Infrastructure required by **other supplementary systems to the food security system** exist or can be developed
106 Infrastructure to educate/train workforce (E.g., extension programs) for various positions with the food value chain exist or can be developed
107 Infrastructure for water and sanitation systems exist or can be developed

108 Infrastructure required for power generation and distribution to food value chain segments exists or can be developed
109 Infrastructure to enable research and improvement of technology and techniques used in the food value chain elements exists or can be developed
110 Infrastructure to produce and distribute equipment for various segments of the food value chain exists or can be developed
111 Infrastructure promotes connectivity between various subsystems

F. Equipment/Supplies



1 **Equipment/Supplies to support effective delivery of food security through an operational food value-chain is in place**
2 Country has equipment/supplies to support the **sourcing of sufficient food** to provide adequate nutrition to all the people of the country
3 Country has or can create access to equipment/supplies needed to support the sourcing of food through regional production
4 Regions that produce food that is adequate or in surplus of nutrition needs of people in the region have or can create access to equipment/supplies needed to perform effective farming practices

5 Communities that contribute to the food produced in the region generate adequate or yield in excess of household requirement (food produced - consumption)

6 Farming at the individual/community level in a region produces excess of individual household requirements

7 Equipment/supplies to support individuals/communities who perform arable farming (growing of crops) exist or can be made available

8 Farmers have access to and implement the use of high-quality inputs (E.g., seeds, nitrogen and phosphorous rich fertilizers)

9 Farmers have access to and capability to utilize farm machinery and equipment (tractors, ploughs, mowers, sprayers) for various farming processes (E.g., ploughing, planting, spraying, harvesting)

10 Equipment/supplies to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exist or can be made available

11 Farmers have access to sufficient sustainable, nutritious livestock feed (E.g., grains, replenishable grazing lands, water)

12 Equipment/supplies to support individuals/communities who perform fishing and aquaculture (rearing of fish) exist or can be made available

13 Fishermen use effective equipment to catch fish

14 Fishermen have sophisticated equipment to catch different types of fish (E.g., nets that can be cast and hauled using motors)

15 Farmers use effective equipment/supplies required to perform aquaculture

16 Farmers use effective techniques to breed fish in freshwater conditions

17 Farmers use effective techniques to perform mariculture (growing or breeding in marine water/brackish water)

18

19 Equipment/supplies to support communities who follow **subsistence farming practice**s to produce adequate food that caters to the nutritional needs of people in the region exists or can be made available

20 Individuals that contribute to the food produced in the region generate enough food to accommodate requirements of their households (E.g., nomadic farming, slash and burn agricultural practices)

Equipment/supplies to support individuals/communities who perform arable farming (growing of crops) exists or can be made available

- Farmers have/can obtain access to crop inputs (E.g., seeds and fertilizers)
- Farmers have/can obtain sufficient water for irrigation
- Farmers have/can obtain access to equipment (E.g., ploughs, sickles, shovels) for various farming processes (E.g., ploughing, planting, spraying, harvesting)

Equipment/supplies to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exists or can be made available

- Farmers have/can obtain access to sufficient sustainable, nutritious livestock feed (E.g., grains, replenishable grazing lands, water)
- Farmers have/can create means to hold livestock (E.g., pens, sheds, coops)

Equipment/supplies to support individuals/communities who perform fishing and aquaculture (rearing of fish) exists or can be made available

- Fishermen use effective equipment to catch fish
  - Fishermen have/can obtain floating vessels to allow them to travel to locations that can yield better quantity/quality of fish (E.g., boats)
  - Fishermen have/can obtain equipment to catch different types of fish (E.g., nets, hooks)

Equipment/supplies to support individuals/households who gather food from other sources (E.g., hunting; gathering of barriers, mushrooms and other vegetation) exists or can be made available

- Individuals/households have/can obtain access to resources for collection of food
- Individuals/households have/can obtain efficient tools to perform hunting/gathering activities

Equipment/supplies required to support effective means to **process food** produced are in place or can be developed

- Equipment/supplies required to support commercial food processing plants for large scale primary, secondary or tertiary food processing exist or can be developed
  - Plants can sustainably source raw materials

Equipment/supplies required for maintaining operations of the plant are or can be made accessible

Small-scale food processing units for distribution of produce within the community exist

Unit can sustainably source raw materials

Equipment/supplies required for maintaining operations of the unit are or can be made accessible

Regional facilities (E.g., farms, food processing units, food distributors) have or can access equipment/supplies to support means to **store food**

Equipment and supplies required to support effective functioning of food storage units exist

Equipment/supplies required for effective means to **distribute food** produced are in place or can be developed

Equipment and supplies required to support the food distribution system exist and are accessible to distributors

G. Workforce/Talent

1	**Workforce/talent to support effective delivery of food security through an operational food value-chain is in place**
2	Workforce/talent can be **trained or educated** for their respective roles
3	Education/training programs exist or can be developed for workforce/talent within the food security system
4	Training programs are accessible
5	Potential workforce/talent can afford the available training
6	Potential workforce/talent is willing to engage in training
7	Equal opportunity for obtaining training is provided to all interested candidates (E.g., gender, race, religion, physical abilities)
8	Potential workforce/talent feels comfortable with training techniques adopted
9	
10	Workforce/talent is **willing to engage in employment**/roles available within the food value chain
11	Food security and nutrition system offers employment opportunities
12	Compensation provided is attractive to potential workforce
13	Safe working conditions are provided
14	Employment provides satisfaction to engaged workforce
15	Employment enables professional growth for interested workforce/talent

16 Equal opportunity for employment is provided to all interested candidates (E.g., gender, race, religion, physical abilities)
17
18 Country has workforce/talent to support the **sourcing of sufficient food** to provide adequate nutrition to all the people of the country
19 Country has or can recruit, or access required workforce/talent needed to support the sourcing of food through regional production
20 Regions that produce food that is adequate or in surplus of nutrition needs of people in the region have or can access required workforce/talent needed to perform effective farming practices
21 Communities that contribute to the food produced in the region generate adequate or yield in excess of household requirement (food produced - consumption)
22 Farming at the individual/community level in a region produces excess of individual household requirements
23 Workforce/talent to support individuals/communities who perform arable farming (growing of crops) exist or can be accessed
24 Farmers have access to skilled and affordable labor to assist with the farm where required
25 Farmers can access and engage with external help from experts where required (E.g., experts who may introduce water management methods in farming)
26 Workforce/talent to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exist or can be accessed
27 Farmers have access to skilled and affordable labor to assist with the farm where required
28 Farmers can access and engage with external help from experts where required (E.g., veterinarian (vets) for the wellbeing of their livestock)
29 Workforce/talent to support individuals/communities who perform fishing and aquaculture (rearing of fish) exist or can be accessed
30 Fishermen have sufficient workforce to perform fishing activities
31 Fishermen have access to skilled and affordable labor where required
32 Farmers have access to workforce/talent to perform aquaculture
33 Farmers use effective techniques to breed fish in freshwater conditions

34 Farmers have access to skilled and affordable labor where required
35 Farmers can access and engage with external help from experts where required (E.g., researchers who may introduce new technologies to improve aquatic farming methods)
36 Farmers use effective techniques to perform mariculture (growing or breeding in marine water/brackish water)
37 Farmers have access to skilled and affordable labor where required
38 Farmers can access and engage with external help from experts where required (E.g., experts on endangered marine species and how to save them)
39 Communities follow subsistence farming practices to produce adequate food that caters to the nutritional needs of people in the region
40 Individuals that contribute to the food produced in the region generate enough food to accommodate requirements of their households (E.g., nomadic farming, slash and burn agricultural practices)
41 Workforce/talent to support individuals/communities who perform arable farming (growing of crops) to yield produce sufficient for individual household consumption during every harvest exist
42 Workforce/talent to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) to yield produce sufficient for individual household consumption during every harvest exists
43 Workforce/talent to support individuals/communities who perform fishing and aquaculture (rearing of fish) to yield produce sufficient for individual household consumption during every harvest exists
44 Workforce/talent to support individuals/households who gather food from other sources (E.g., hunting; gathering of barriers, mushrooms and other vegetation) exists
45
46 Workforce/talent to support Country when it sources food and supplements to produce food through **external aid** to accommodate shortage, if any, in production exists
47

48 Workforce/talent to perform **processing of food** produced exist or can be accessed where required

49 Workforce/talent required to support commercial food processing plants for large scale primary, secondary or tertiary food processing exist or can be accessed

50 Skilled workforce to perform various tasks within the processing plant exist

51 Workforce trained to operate machinery exist or can be recruited

52 Workforce to monitor quality of food produced exist or can be recruited

53 Workforce to maintain the operation, hygiene and sanitary needs of the facility exist or can be recruited

54 Workforce to manage the plant exist or can be recruited

55 Workforce can be locally sourced

56 Small-scale food processing units for distribution of produce within the community exist

57 Skilled labor manages and runs the unit

58

59 Workforce/talent needed to support **storage facilities** exist or can be recruited

60 Workforce to support the functioning and maintenance of regional storage units exist

61

62 Effective means to **distribute food** produced are in place

63 Workforce to support food distribution mechanisms and systems exist

64

65 Workforce/talent who can support and enable development within the food value chain exist or can be identified and engaged when needed

66 Leadership who can be sought to overcome existing local challenges exist or can be elected

67 Researchers who can improve/develop existing practices and technologies exist or can be sourced

68 Experts on climate variation and its influence on the food value chain are accessible where required

69 Experts on environmental impact of various activities within the food value chain are available/accessible where required

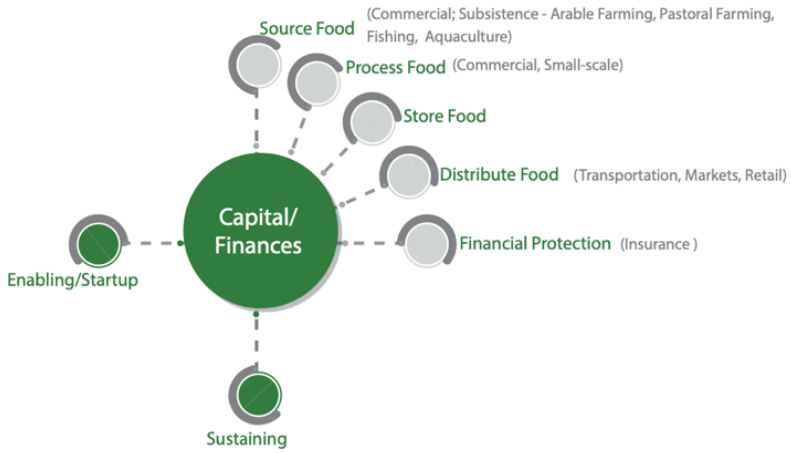
70 Private sector/non-profit entities are available/accessible where required

71 Experts on resource management are available/accessible where required

72 Local operators for supporting systems (E.g., water, electricity) exist or can be appointed

73 Engineers required for infrastructure development exist or can be sourced

H. Capital/Finances



1	**Capital/finances to start/support segments that facilitate effective delivery of food security through an operational food value-chain can be accessed**
2	Country has/can provide capital to support the **sourcing of sufficient food** to provide adequate nutrition to all the people of the country
3	Country has or can provide access to capital needed to support the sourcing of food through regional production
4	Regions that produce food that is adequate or in surplus of nutrition needs of people in the region have or can create access to capital needed to perform effective farming practices
5	Startup capital is available to food producers where required
6	Communities that contribute to the food produced in the region generate adequate or yield in excess of household requirement (food produced - consumption)
7	Farming at the individual/community level in a region produces excess of individual household requirements

8 Capital/finances to support individuals/communities who perform arable farming (growing of crops) exists or can be accessed

9 Farmers have/can obtain large pieces of arable land

10 Farmers have/can access capital to carry out farming/agricultural practices and can accommodate economic fluctuations (E.g., cash access)

11 Farmers have/can obtain access to financial mechanisms that facilitate a marketplace for excess produce sales

12 Capital/finances to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exists or can be accessed

13 Farmers have/can obtain sufficient livestock to sustainably produce excess food

14 Farmers have/can access capital to sustain livestock requirements (E.g., money for food, shelter, medication of livestock)

15 Farmers have/can obtain access to financial mechanisms that facilitate a marketplace for excess produce sales

16 Capital/finances to support individuals/communities who perform fishing and aquaculture (rearing of fish) exist or can be accessed

17 Fishermen have/can access sufficient capital to perform fishing activities

18 Farmers have sufficient capital to perform aquaculture

19 Farmers use effective techniques to breed fish in freshwater conditions

20 Farmers have/can access capital to start and manage operations of the farm

21 Farmers have/can obtain sufficient area to carry out farming practices

22 Farmers use effective techniques to perform mariculture (growing or breeding in marine water/brackish water)

23 Farmers have/can access capital to start and manage operations of the farm

24 Farmers have/can obtain sufficient area to carry out farming practices

25 Communities follow subsistence farming practices to produce adequate food that caters to the nutritional needs of people in the region

26 Individuals that contribute to the food produced in the region generate enough food to accommodate requirements of their households (E.g., nomadic farming, slash and burn agricultural practices)

27 Capital/finances to support individuals/communities who perform arable farming (growing of crops) exists or can be accessed

28 Farmers have/can obtain sufficient arable land to produce food for their households

29 Farmers have/can access capital to carry out farming/agricultural practices and, if susceptible, can overcome vulnerability to economic fluctuations

30 Capital/finances to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) exist or can be accessed

31 Farmers have/can obtain sufficient livestock to produce sufficient food for their family

32 Farmers have/can access capital to sustain livestock requirements (E.g., food, shelter, medication)

33 Farmers have/can develop means to hold livestock (E.g., pens, sheds, coops)

34 Capital/finances to support individuals/communities who perform fishing and aquaculture (rearing of fish) exist or can be accessed

35 Fishermen have sufficient capital to perform fishing activities

36 Capital/finances to support individuals/households who gather food from other sources (E.g., hunting; gathering of barriers, mushrooms and other vegetation) exist or can be accessed

37
38 Capital/finances to support country when its sources food and supplements to produce food through external aid to accommodate shortage, if any, in production exists
39 Country has/can source sufficient funds to import food
40
41 Sufficient capital/finances to support means to **process food** produced are in place or can be accessed
42 Capital/finances required to support commercial food processing plants for large scale primary, secondary or tertiary food processing exist or can be sourced
43 Start-up capital required for processing plants can be accessed where required
44 Food processing facility is economically self-sustainable
45 Sufficient raw material to run operations in an energy and economically efficient way can be sourced
46 Transportation mechanisms exist to source raw material
47 Workforce for loading/unloading and transporting purposes exist where required
48 Sufficient output to create profits can be produced
49 There is sufficient sustainable demand for the processed food
50 Capital/finances required to support small-scale food processing units for distribution of produce within the community exist or can be accessed
51 Sufficient capital is sourced to start the unit and purchase/setting up required equipment (E.g., large utensils, furnace/kiln)
52 Unit is economically self-sufficient
53
54 Regional facilities (E.g., farms, food processing units, food distributors) have/can access capital to support effective means to **store food**
55 Capital/finances to support the functioning and maintenance of regional storage units exist
56

57 Effective means to **distribute food** produced are in place

58 The food distribution segments (E.g., transport, market/retail store) are economically self-sustainable

59

60 **Precautionary mechanisms to financially protect entities within the food value chain exists**

61 Insurance policies to manage risk within the food delivery system exists

62 Insurance policies and measures to protect food producers of the country exists

63 Farmers have access to insurance for their crops

64 Farmers have access to insurance for their livestock

65 Aquaculturists have access to insurance for their livestock

66 Insurance policies to manage risk among other segments of the food delivery system exists

67 Business interruption insurance is available for entities that require it

68 Hazard insurance is available for entities that require it

69 Fire insurance is available for entities that require it

70 Automobile insurance policies are available for transportation facilities within the food delivery system

71 Insurance schemes exist to cover work related injuries

72 Biological safety principles are followed where required

73 Safe working environment can be established

I. Practices/Mechanisms

1 **Practices/mechanisms to support effective delivery of food security through an operational food value-chain is in place**

2 Country implements effective practices/mechanisms to support the **sourcing of sufficient food** to provide adequate nutrition to all the people of the country

3 Country implements effective practices to support the sourcing of food through regional production

4 Regions that produce food that is adequate or in surplus of nutrition needs of people in the region implement effective farming practices

5 Communities that contribute to the food produced in the region generate adequate or yield in excess of household requirement (food produced - consumption) through effective mechanisms/practices

6 Farming at the individual/community level in a region produces excess of individual household requirements

Practices/mechanisms to support individuals/communities who perform arable farming (growing of crops) are implemented

- Farmers are educated about/aware of how to maintain long-term quality of arable land (E.g., through use of fertilizers, crop rotation methods)
- Farmers are educated about diversification of crops produced (E.g., knowledge about which crops to grow in which season in order to have year-round yield)
- Farmers implement efficient/sophisticated water management practices based on the region (E.g., effective drainage in areas with high rainfall or drip irrigation methods in places with low rainfall)
- Farmers implement efficient resource management practices
- Farmers utilize efficient/high quality pest control practices to preserve crops (E.g., insecticides, fungicides, herbicides, competitive insects, natural deterrents)
- Farmers utilize effective drying and storage practices to maximize longevity of harvested crops (E.g., prevent aflatoxin contamination)
- Farmers are aware of effects of climate changes (E.g., change in rainfall pattern) and how to adjust for it (climate change adaptation and mitigation techniques)
- Farmers perform sedentary farming (farms are permanently located in one place)
- Farmers that have the capability, perform commercial farming

Practices/mechanisms to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) are implemented

- Farmers perform effective livestock disease control practices and know how to handle occurrence of common diseases

19 Farmers work on genetically improving varieties of livestock (E.g., increase food efficiency, reduce methane production) where possible
20 Farmers implement efficient resource management practices
21 Practices/mechanisms to support individuals/communities who perform fishing and aquaculture (rearing of fish) are implemented
22 Fishermen use effective techniques to catch fish
23 Fishermen are cognizant of environment impacts and follow policies on fishing in different water bodies
24 Fishermen have effective means to store fish in a way to preserve it for consumption
25 Fishermen are informed about different types of aquatic foods that are nutritious and have market demand (E.g., aquatic plants, fish, crustaceans, mollusks)
26 Fishermen use efficient fishing techniques based on location and water body (E.g., sea, ocean, river, stream, pond)
27 Fishermen are aware of impacts of climatic changes and how to adapt to it
28 Farmers use effective techniques to perform aquaculture
29 Farmers use effective techniques to breed fish in freshwater conditions
30 Farmers have adequate technological expertise to manage aquatic farms (E.g., life cycle of fish to be bred)
31 Farmers are aware of seasonal effects on produce and adjust for it
32 Farmers are equipped to handle diseases that can affect the fish grown (E.g., fungal infections, parasites)

33 Farmers use effective techniques to perform mariculture (growing or breeding in marine water/brackish water)

34 Farmers have adequate technological expertise to manage marine farms

35 Farmers are aware of tidal and seasonal effects on produce and adjust for it

36 Farm locations are appropriate

37 Farmers are aware of market demands and competition and are able to adjust according to it

38 Communities follow subsistence farming practices to produce adequate food that caters to the nutritional needs of people in the region

39 Individuals that contribute to the food produced in the region generate enough food to accommodate requirements of their households (E.g., nomadic farming, slash and burn agricultural practices)

40 Practices/mechanisms to support individuals/communities who perform arable farming (growing of crops) are implemented

41 Farmers are aware of how to maintain quality of arable land (E.g., through use of fertilizers, crop rotation methods)

42 Farmers are educated about diversification of crops produced (E.g., knowledge about which crops to grow in which season in order to have year-round yield)

43 Farmers implement effective water management practices

44 Farmers utilize efficient pest control practices to preserve crops (E.g., insecticides, fungicides, herbicides)

45 Farmers are aware of effects of climate changes (E.g., change in rainfall pattern) and how to adjust for it (climate change adaptation and mitigation techniques)

46 Farmers have an understanding about shared communal lands

47 Practices/mechanisms to support individuals/communities who perform pastoral farming (rearing of animals for meat, eggs, dairy) are implemented

48 Farmers perform effective livestock disease control practices and know how to handle occurrence of common diseases

49 Farmers implement efficient resource management practices

50 Practices/mechanisms to support individuals/communities who perform fishing and aquaculture (rearing of fish) are implemented

51 Fishermen use effective techniques to catch fish

52 Fishermen are cognizant of environment impacts and follow policies on fishing in different water bodies

53 Fishermen have effective means to catch and consume fish that is appropriate for consumption

54 Fishermen use efficient fishing techniques based on location and water body (E.g., sea, ocean, river, stream, pond)

55 Fishermen are aware of impacts of climatic changes and how to adapt to it

56 Practices/mechanisms to support individuals/households who gather food from other sources (E.g., hunting; gathering of barriers, mushrooms and other vegetation) exists

57 Individuals/households have means to store and preserve collected food

58 Individuals/households are aware of environmental impacts of hunting

59 Individuals/households are aware of environmental impacts of gathering vegetative food from wildlands

60 Individuals/households are aware of and follow policies of hunting and protection of wildlife

61 Individuals/households are aware of and follow policies of gathering vegetative food and protection of plant species
62 Hunting policies facilitate preservation of resources
63 Hunting policies ensure reliant communities are not cut-off from access to needed game or provide alternate resources
64
65 Practices/mechanisms to support Country when it sources food and supplements to produce food through **external aid** to accommodate shortage, if any, in production exists
66 Country can import food/request for food-aid to accommodate shortage within the country
67 Standard operating procedures for the import of food exist and are implemented
68 Imported food does not adversely impact local markets
69 Imported food is of desired nutrition value
70 Country has effective operational mechanisms to check quality and safety standards of food imported
71 Country is aware of and is capable of adjusting to fluctuations in pricing
72 Country is aware of and is capable of adjusting to fluctuations in food availability
73 Country maintains good relations with food donor countries
74 Country is aware of risk associated with international trade in food
75 Food imported caters to cultural and dietary preferences of the consumers
76 Food imported is affordable
77 Food imported is accessible
78
79 Effective **post-harvest handling** mechanisms exist to prevent spoilage of food produced
80 Standard procedures and mechanisms for treating/processing grains are implemented where needed (E.g., post-harvest)
81 Standard procedures and mechanisms for treating/processing meat and poultry are implemented where needed
82 Standard procedures and mechanisms for treating/processing fruits and vegetables are implemented where needed
83 Standard procedures and mechanisms for treating/processing dairy are implemented where needed
84 Standard procedures and mechanisms for treating/processing fish are implemented where needed (E.g., salting)
85

86 Effective means to **process food** produced are in place
87 Commercial food processing plants for large scale processing exist
88 Methods of assessing food quality are standardized and implemented
89 Bacterial contamination checks are made at various stages
90 Inspection of nutrient composition of foods produced is performed during the food processing stage
91 Inspection of expiry is performed during processing, transportation and distribution phases
92 Chemicals/processes used to maintain food quality are utilized in a sanitary way
93 Small-scale food processing units for distribution of produce within the community exist
94 Efficient and sanitary techniques for food processing are implemented
95 Unit has demand for processed food
96 Process implemented allows preservation of quality and nutrient content of food
97 Effective mechanisms exist to ensure quality of food distributed by small-scale food suppliers
98 Effective mechanisms exist for consumers to assess quality of food distributed by small-scale food suppliers
99 Consumers are informed about simple tests/checks they can perform on fresh produce/packaged goods to ensure quality
100 Small-scale suppliers practice safety and hygiene to ensure good quality of goods produced
101 Small-scale suppliers are informed about safe and hygienic practices to follow to ensure good quality of goods produced
102
103 Regional facilities (E.g., farms, food processing units, food distributors) have effective means to **store food**
104 Mechanisms to ensure effective functioning of food storage units exist
105 Mechanisms that ensure protection of food against spoiling/wastage are implemented (E.g., protecting grains from moisture, protecting dairy products)
106 Standard methods to monitor quality of food are operational and performed regularly
107 Storage unit workforce practice hygiene
108

109 Effective means to **distribute food** produced are in place
110 Practices/mechanisms to support the food distribution system are in place
111 Food distribution workforce exercise efficient and hygienic practices

J. Awareness

1 **Country is aware of the availability of and means to access sufficient and nutritious food**
2 Content used to spread awareness about food and nutrition is effective
3 Content is based on formative research and has been proven to be effective
4 Content is culturally appropriate and aligns with values of target audience
5 Content motivates population to adopt healthy diets
6 Content is specific to context and target audience
7 Variations in literacy are surmountable

Content is sensitive to variations in literacy

Majority of the target audience finds content easy to understand (E.g., Use of more pictorial representations, avoidance of difficult words or phrases)

Content can sensitize population about food and nutrition in order that communities adopt healthy diets

Awareness can be raised among different sectors of the population involved

Awareness can be raised among **government officials and local leaders** about various aspects of food security and nutrition

Awareness about requirement of efficient food production/delivery system is raised among the government and local leaders

Awareness can be raised among Government and local leaders about the need for better food sourcing and delivery system in the region

Awareness can be raised about the requirement to strengthen delivery of good quality and nutritious food in the region (E.g., statistics show a large percentage of the population in the region is underweight)

Awareness can be raised about the existence of double burden of malnutrition within the region of control

Awareness can be raised on the particular segment of the food delivery supply chain that requires immediate attention in the region to allow adequate, secure and consistent food delivery (E.g., warehouses are required to store food, transportation facility is required)

Awareness can be raised where people know about requirements to maintain good health through adequate nutrition intake but do not know how to avail good quality food

Local leaders can be made aware of means to develop/strengthen the food supply chain

Local leaders and influencers of change are informed about means to setup/strengthen segments of the food supply chain that are found to be weak or non-existent

Local leaders and influencers of change are informed about existing food and nutrition policies that they need to ensure for adequate delivery of nutritious food

Local leaders and influencers of change are informed about how to aid in overcoming double burden of malnutrition in the region

Awareness can be raised among **potential and existing food system workforce/talent** about various aspects of food security and nutrition

Awareness can be raised among potential food system workforce (E.g., nutritionists, farmers, food processors, food distributors) about opportunities in the food and nutrition domain and required qualifications/certifications.

Awareness is raised about ways in which to engage in the food system

Awareness is raised about extension programs and services

Job opportunities in the food and nutrition domain are appealing

Awareness can be raised among existing food and nutrition supply chain segments about requirement to provide adequate and nutritious food to all households

Awareness is raised among target populations at the source of the food supply chain about nutrition and food quality (E.g., agriculturists)

Farmers are informed about demand to be met

Farmers are informed about practices that yield nutritious food (E.g., ways to maintain health of livestock)

Farmers are informed about practices that help avoid losses (E.g., losses due to pests can be avoided by use of pesticides)

Awareness is raised among food processing units about quality standards to uphold for delivery of healthy, nutritious food

Awareness is raised among target populations about food quality checks and certification requirements (E.g., requirements that processed food must meet, expiry date)

Awareness is raised among food transporters and distributors about hygienic and safe practices while handling food

Awareness can be raised among food and nutrition supply chain segment **workforce/talent** about mechanisms to provide adequate and nutritious food to all households

Awareness is raised among target populations about methods to develop/strengthen food procurement processes (E.g., agriculturists)

Farmers are informed about new technologies available to implement for better crop/livestock yield and how to access them (E.g., tractors for ploughing the fields)

Farmers are informed about new techniques to implement for better crop/livestock yield (E.g., better sowing or irrigation methods, different diets for livestock)

Farmers are informed about resource management techniques (E.g., finance management, water resource management, land use)

Farmers are informed about avenues to sell their goods (E.g., potential wholesalers, local markets)

Farmers are informed about ways to prepare themselves for climate variations (E.g., through use of irrigation systems like drip irrigation during droughts)

Farmers have access to accurate climate predications to prepare themselves

Awareness is raised among target populations about methods to setup/strengthen food processing units

Awareness is raised among target populations about methods to develop/strengthen food distribution networks and processes

Awareness is raised among target segments of the supply chain on methods to alleviate wastage of food

Awareness is raised on coping mechanisms/adaptive capacities in times of risk or fluctuations in supply

Awareness can be raised among **potential and existing food system partners** about various aspects of food security and nutrition

Possible partners can be approached to contribute to the food system

Awareness can be raised among non-profit groups about opportunities for engagement in the food supply chain

Possible private sector partners can be made aware of opportunities to engage in the food supply chain

Other potential partners can be identified and made aware of opportunities to engage in the food supply chain

Awareness can be raised among **consumers** about various aspects of food security and nutrition

Target populations/communities are made aware of importance of consuming adequate and nutritious food

Consumers are aware of importance of good food and nutrition intake

Target populations have a good understanding of what is "nutrition"

Target populations have a good understanding of what is "healthy food"

Target populations are informed about different biological nutritional needs of individuals at different stages of their lifetime (E.g., biological nutrition needs of a newborn are different from that of an adolescent)

Target populations are informed about the quantities of specific food that should constitute their diet (balanced diet that

includes macronutrients like carbohydrates, proteins, and fats and micronutrients like vitamins and minerals)

63 Target populations are informed about health benefits of consuming nutrient rich diet (E.g., resilience to certain diseases)

64 Target populations are informed about where to access nutritious food

65 Target populations are informed that they can grow their own food along with ways to do so

66 Target populations are informed about simple everyday measures to ensure quality of food they consume (E.g., checks to make sure fresh produce is consumable, hygienic practices while handling food)

67 Target populations are informed about the "double burden of malnutrition" and how it can occur and individual or at household level

68

69 Consumers are informed about where/how they can access sufficient nutritious food

70 Populations are informed about food options that are more nutritious than others and how to identify them (E.g., fresh foods/naturally produced foods are better than processed foods)

71 Populations are informed about experience characteristics (that come from self-experiences) and credence characteristics (details they can find from third parties) to assess quality of food

72 Populations are informed about hygienic practices to follow while handling food (E.g., use clean water to wash hands, wash fruits/vegetables, use clean water while cooking, clean utensils)

73 Populations are informed about where they can obtain good quality food at affordable prices

74 Populations can be informed about where to access inputs required to grow their own produce on a small scale

75 Populations that identify the existence of double burden at the individual or household level are informed about how to overcome it

K. Motivation

1 **Country is motivated to engage in and support available food system**

2 The beliefs, attitudes and perceptions of populations towards adopting healthy diets and nutritious food in different regions are understood

3 Effective channels and reliable means exist to perform a formative assessment of populations' beliefs, attitudes and perceptions

4 Mechanisms used to perform formative assessment are appropriate for specific context

5 Rigorous assessments are made to obtain comprehensive data on the knowledge and attitudes of people towards adequate, healthy food

6 Data collected from assessments are effectively analyzed

7 The analysis results are utilized to drive change in populations' motivation and behavior

8

9 Evidence-based intervention strategies are employed to motivate populations at different stages of change

Individuals/communities in the pre-contemplation stage (where they are not considering the nutritional impact of the food they consume) can be motivated to consider nutritional requirements and impact

- Influencers of change are motivated to consider the need to provide access to adequate and diverse nutritious food
- Target populations are motivated to consider benefits of consuming nutritious diets
  - Barriers preventing consideration of purchasing healthy foods (E.g., lack of finances to cover costs, gender inequality) are identified
    - Strategies to facilitate equitable access to adequate, diverse nutritious food are implemented
    - Viable private sector channels are considered and employed to overcome barriers (E.g., advertisements through trusted channels)
  - Communities are conscious about existing living conditions and possible healthier lives after obtaining food security (E.g., consuming adequate nutrition can reduce stunted development in children)
    - Individuals, families and communities feel empowered and believe they can create meaningful impact in their lives
      - Individuals and families care about their health
      - Communities are aware of channels they can use to influence change in their lives
      - Communities believe they can create the change they want to see
      - Communities are aware that food security is a shared national responsibility

Individuals/communities in the **contemplation stage** (contemplating the benefits of consuming/delivering adequate nutritious food) can be motivated to engage in the available food system

- Government, local leaders and influencers of change believe they can benefit population by facilitating awareness and access to nutritious food

25 Government and local leaders care for the greater good of the communities, regions and the nation
26 Leadership is convinced that improving access to good quality food can improve economy
27 Leadership acknowledges that individual's consumption of good quality food has a long-term impact on their health, which in turn produces able-bodied workforce for the nation
28 Local leaders are inclined to strengthen household food security by building the capacity of local talent and local markets (external food aid is very difficult to compete with and causes local markets to shut down)
29 Target individuals, families and communities (E.g., food insecure, nutritionally vulnerable populations) are convinced about benefits of healthy eating habits
30 Barriers preventing target populations from consuming healthy food are minimized or overcome
31 The priorities of individuals/families are assessed
32 Accessibility issues are identified
33 Healthy food options are made a comparatively more appealing alternative to existing food options
34 Families and households are exposed to convincing messages to prioritize adequate nutritious food for all members of the family
35 Skilled individuals are motivated to participate in the food value-chain system
36 Working conditions promote interest in job opportunities (E.g., appropriate hours of work and good pay)
37 Jobs in food value-chain system are perceived as respectable
38 Equal opportunities are offered to all qualified applicants (E.g., irrespective of religion, cast, race, gender, abilities)
39 Opportunities to volunteer and serve in segments of food delivery system are provided
40 Skilled individuals have an entrepreneurial trait
41 Skilled individuals have the capacity to manage a scalable food business (E.g., affordable trainings may be provided for capacity building)
42 Skilled individuals have ability to expand their business

43 Incentives to engage in food supply chain are attractive (E.g., banks provide subsidies for loans)

44 Procedure to obtain trainings/certifications required are not difficult (E.g., training on how to handle certain machinery/equipment, quality certifications)

L. Enabling Resources

1 **Enabling Resources can be utilized to overcome barriers, if they exist, to delivery of adequate nutritious food to all households**

2 Regions produce food that is not adequate to fulfill nutrition needs of people in the region and can improve through effective farming practices

3 Communities do not produce adequate food to sustain the nutrition needs of the region but can do so (attain subsistence farming status) by overcoming certain barriers

4 Individuals/communities face arable farming challenges that can be overcome

5 Alternative methods can be used where arable land is limited (E.g., intensive farming techniques)

6 Soil improvement methods can be implemented where soil degradation is resulting in lower/no yield

7 Access to input materials (E.g., seeds, fertilizers) can be created where there is limited/no access

- Energy requirements to facilitate in-country fertilizer production can be achieved
- Import channels for fertilizer access are effective where in-country production is not feasible
- Economic policies (E.g., subsidies) enable fertilizer access where otherwise unviable

- Access to water can be created where there is insufficient water for agriculture (E.g., through external aid or by educating population on water storing/conserving techniques)
- Access to pest control measures can be created where there is limited/no access
- Labor can be sourced in regions with low labor and high employment opportunities
- Economic barriers can be overcome
- Climate resilience mechanisms can be developed/strengthened where required (climate change adaptation and mitigation techniques)
- Practices of crop production for part of the year can be extended to year-round production where possible (E.g., where farmers are not aware of crop rotation techniques)

- Individuals/communities face pastoral faming challenges that can be overcome
  - Access to livestock feed can be created
  - Economic barriers can be overcome
  - Diseases that cause high mortality among livestock/render their produce inconsumable can be overcome
  - Farmers are educated on maintenance of livestock for improved yield
  - Farmers are taught about livestock rearing to have a sustainable source of food

Economic barriers in providing food security and nutrition, and in receiving adequate nutritious food can be overcome

25 Economic barriers with regard to creating availability of adequate nutritious food can be overcome

26 Allocation of finances within the food value chain system is done based on past results from performances of various sub-sectors

27 Opportunities to engage non-profit resources are effectively utilized

28 The food and nutrition production and delivery system are economically scalable

29 Sources are available to sponsor system start-up or to gain/augment government financial support

30 Food produced is made more affordable by strengthening different segments of the supply chain

31 Mechanisms to procure funds are in place to support food sourcing (E.g., agriculture, international aid)

32 Government allocates funds to strengthen agricultural sector of the country

33 Market and private sector are encouraged to provide input and financial services at affordable prices to agriculturists

34 Production inputs are subsidized for target populations through appropriate mechanisms to make it more affordable

35 Mechanisms to procure funds are in place to support food storage

36 Mechanisms to procure funds are in place to support food transportation facilities

37 Mechanisms to procure funds are in place to support food distribution facilities (E.g., market development)

38 Mechanisms to procure funds are in place to support advertisements/knowledge sharing strategies to facilitate consumption of adequate nutritious food

39 Mechanisms to procure funds are in place to support food emergencies

40 Funds account for various costs involved (E.g., commodities, interventions, programs and their management costs)

41 Cost sharing opportunities are utilized
42 Opportunities of sourcing private sector capital are utilized where/when needed
43 Opportunities of sourcing non-profit capital are utilized where/when needed
44 Opportunities of sourcing non-traditional capital are utilized
45 Viable opportunities for industry engagement are utilized (E.g., use of private sector distribution networks, use of private sector storage facilities)
46 Opportunities to obtain external monetary aid are utilized (E.g., USAID)
47 Monetary transaction costs at country level are kept in check (to avoid paying high exchange rates)
48 Other possible partnership opportunities between food delivery system and entities within the country are tapped
49 Possibility of corruption can be circumvented
50 All entities in the food delivery system that utilize funds are held accountable for it
51 A business model can be developed that accounts for variations in community purchasing power
52 The cost to employ skilled workforce for food security systems and services can be supported by the system business model
53 The cost of utilizing technology for food security can be supported by the system business model
54 The cost to develop/implement food technology products can be supported by the system business model
55 The cost to produce/implement development and distribution of food technology products (E.g., vitamin tablets or food supplements) for food security can be supported by the business model
56 The cost to construct and maintain infrastructure for food delivery can be supported by the business model
57 Business model accommodates inter and intra domain integration of services to avoid duplication and wastage

- Economic barriers with regard to creating accessibility to adequate nutritious food can be overcome
  - Costs of nutritious food are controlled to local economic capacity
    - The economics of the system are appropriately tailored to local income levels
      - Cost of food can be subsidized to make it affordable for people with low incomes
      - The economy can be strengthened by providing better job opportunities with better pay

- Precautionary mechanisms to financially protect entities within the food value chain exists
  - Insurance policies to manage risk among food consumers exits
    - Health insurance policies are available
    - Life insurance policies are available

Functional barriers, if they exist, can be overcome

- Infrastructural barriers can be overcome
  - Infrastructural barriers with respect to food sourcing can be overcome based on the scale and venue (E.g., large farm equipment requirements can be met, small-scale farm maintenance requirements can be met, port for import/export can be developed where required)
  - Infrastructural barriers with respect to food processing can be overcome based on the scale
  - Infrastructural barriers with respect to food storage can be overcome based on the scale
  - Infrastructural barriers with respect to food distribution can be overcome based on the scale
    - Transportation system barriers can be overcome
- System scaling barriers can be overcome where they exist

78 Supply chain can be shortened to avoid middlemen and allow individual producers to direct sell their goods to consumers or markets at suitable locations through Producer Associations

79 Producer associations have a strong governing structure with specific tasks assigned to specific roles

80 Producer associations have sufficient workforce

81 Producer associations collect adequate goods to sell

82 Members of producer associations check quality of goods collected and grade them for selling at different markets (E.g., high-quality goods like cocoa and coffee for export, lower quality goods for sale at local markets)

83 Producer associations are economically self-sufficient

84 Producer organizations are equipped with appropriate infrastructure to transport, store, and sell various goods (E.g., cold chain for meat and dairy)

85

86 **Quality barriers** do not exist or can be overcome

87 Acceptable disciplinary measures are in place for taking action against misconduct within the food delivery system

88 Acceptable disciplinary measures are in place for not meeting quality requirements

89 Acceptable disciplinary measures are in place for not meeting stated nutrition composition

90 Acceptable disciplinary measures are in place to prevent conflicts that disrupt consistent supply of nutritious food

91

92 **Social barriers** do not exist or can be overcome

93 Cultural barriers, if exist, can be overcome

94 Gender inequality, when it comes to receiving nutrition, if exists, can be overcome

95 Cultural ideals that prevent use of arable land are overcome

96 Cultural issues (child labor), if exist, can be overcome

97 Cultural barriers preventing consumption of nutritious food are identified and overcome
98 Barriers related to workforce and employment availability, if exist, can be overcome
99 Barriers preventing growth of workforce (E.g., farm owners/startups, farmhands) are overcome
100 Barriers preventing regular availability of workforce are overcome
101 Barriers preventing regular availability of jobs are overcome
102 Gender issues can be overcome
103 Jobs in the food value-chain system promote gender equality
104 Conflicts that arise because of gender differences can be overcome
105 Stigma and communication challenges because of gender differences can be overcome
106 Communities are willing to avail adequate nutritious food available
107 Community is willing to take responsibility for its well being
108 Community will relinquish present impeding behaviors in favor of desired behaviors
109 Community is optimistic about its future
110 Community values community welfare
111 Local community members will be comfortable with the food delivery system
112 The food supplier(s) is/are willing to cater to regional needs without biases
113 Conflicts, if they exist, can be resolved
114 Territorial disputes on food distribution can be overcome
115 Competing demands for adequate food for different regions can be negotiated
116 Ownership conflicts influencing access to food security can be resolved
117 Infrastructure exists to facilitate communication between different stakeholders
118 Social group biases do not exist or can be overcome

Religious barriers do not exist or can be overcome (E.g., religious group segregations/ethnic group segregations)

Language variations/barriers between people from different regions can be overcome

Local community members are comfortable with the market system and food supplier(s)

Local and regional food system operators are comfortable working with each other

Awareness can be raised where people are aware of the requirement of nutritious food and how to access it but do not know how to overcome specific barriers

Existing barriers are identified

Skills related barriers are identified (E.g., Insufficient workforce to support food system)

Wealth related barriers are identified (E.g., Financial capacity to purchase healthy food is insufficient, financial capacity to engage in food supply chain is insufficient)

Access related barriers are identified (E.g., Fertile land is not available in regional location, food distribution system unavailable)

Time related barriers are identified (E.g., food supply unit is operational only for limited hours)

Behavior/Habit related barriers are identified (E.g., consistently consuming unhealthy food)

Culture/religion/tradition related barriers are identified (E.g., girls of a family do not receive adequate nutrition)

Knowledge barriers are identified (E.g., the knowledge that healthy mothers who have received adequate nutrition can provide newborns with required nutrition through breast milk)

Effective strategies to address specific barriers are developed

The barriers to be addressed are identified and prioritized

The impact on nutrition intake of a population due to a skill-based barrier is assessed

136 The impact on nutrition intake of a population due to a wealth-based barrier is assessed

137 The impact on nutrition intake of a population due to access-based barrier is assessed

138 The impact on nutrition intake of a population due to a time-based barrier is assessed

139 The impact on nutrition intake of a population due to a behavior-based barrier is assessed

140 The impact on nutrition intake of a population due to a cultural barrier is assessed

141 Strategies to address specific high priority and high impact barriers are implemented based on prioritization

M. Adoption/Habit Conversion

1 **Individuals/communities that have chosen healthy food options can be encouraged to maintain their engagement**

2 Government and local leaders are motivated to continue supporting the requirements for delivery of adequate, diverse nutritious food for all households

3 The outcomes of providing adequate, good quality food to the people can be measured

4 Existing solutions are driving a year over year reduction in underweight population
5 Existing solutions are driving a year over year improvement in child health (E.g., decrease in infant mortality rate, decrease in mortality rates of children under the age of five)
6 Provision of access to adequate food and nutrition promotes health equity among communities
7 Households in communities are motivated to provide healthy food for all members of the household
8 Households and communities can observe improvements in health of families who consume healthy, nutritious food
9 Food supply chain workforce is motivated to continue improving and facilitating delivery of good quality, nutritious food for all
10 Workforce involved in food procurement process is motivated to continue producing/procuring high quality food
11 Workforce involved in food processing is motivated to continue producing high quality, nutritious food
12 Workforce involved in food transportation/storing process is motivated to continue maintaining the high quality of produced food
13 Workforce involved in food distribution process is motivated to continue distributing high quality food
14 Partners continue to engage in food delivery system
15 Private sector partners continue to aid in food delivery system
16 Non-profit organizations continue to aid in food delivery system
17 Communities are presented with opportunities to volunteer and/or engage in the food delivery system
18 Existing food producers are motivated to improve their techniques
19 Farmers that produce insufficient yield are motivated to learn and implement methods to attain subsistence farming status
20 Subsistence farmers are motivated to learn and implement techniques to obtain surplus yield that can then be sold to meet local foods deficits
21 Large-scale food producers in the region are motivated to learn and implement techniques that allow them to perform commercial farming or export their goods

N. Measurements and Evaluations

1 **Indicators to measure effectiveness of delivery of food security and adequate nutrition exist**
2 Indicators to measure food availability indicate improvement in efficiency of food security and nutrition delivery
3 Average dietary energy supply consumption approaches 100%
4 Portion of energy supply derived from consumption of cereals, roots and tubers shows an increase
5 Average protein supply meets country's requirements
6 Average animal protein supply meets country's requirements [1]
7 Supply of micronutrient (E.g., Vitamin A, B, C, D, Iron, Iodine) rich food meets country's nutrition requirement
8 Indicators to measure accessibility show improvement in efficiency of food security and nutrition delivery
9 Rail line density achieves required density set by country
10 Gross Domestic Product per Capita shows an increase
11 Prevalence of undernourishment shows a decrease
12 Severe food insecurity prevalence in the total population shows a decrease [2]
13 Indicators to measure stability food security and nutrition delivery indicates improvement in efficiency
14 Cereal import dependency ratio shows a decrease
15 Percentage of arable land equipped for irrigation shows an increase

1 72 V. Bini, Food security and food sovereignty in West Africa. *African Geographical Review*, **37**, 1-13 (2018).
2 J. R. Anderson, "Concepts of Stability in Food Security" in *Encyclopedia of Food Security and Sustainability*, P. Ferranti, E. M. Berry, J. R. Anderson, Eds. (Elsevier, 2019), vol.2, chap. 2.

16 Value of food imports over total merchandise exports shows a decrease [3]
17 Political stability and absence of violence/terrorism/monopoly shows an increase [4]
18 Per capita food production variability meets requirements according to per capita consumption variability [2]
19 Per capita food supply variability meets requirements according to per capita food consumption variability
20 Indicators to measure utilization and uptake of nutritious food indicates improvement in efficiency of food security and nutrition delivery
21 Percentage of children under 5 years of age affected by wasting shows a decrease [3]
22 Percentage of children under 5 years of age who experience stunting shows a decrease [3]
23 Percentage of children under 5 years of age experiencing cognitive effects of low iodine shows a decrease [2]
24 Percentage of children under 5 years of age who are overweight shows a decrease [3]
25 Prevalence of obesity in the adult population (18 years and older) shows a decrease [3]
26 Prevalence of anemia among women of reproductive age (15-49 years) shows a decrease [3]
27 Prevalence of exclusive breastfeeding among infants 0-5 months of age shows an increase [3]
28 Indicators to measure existence of double burden shows a steady decline with improvement of food security and nutrition delivery
29 Trends in communicable (E.g., HIV, tuberculosis, malaria) and non-communicable diseases (high blood pressure, diabetes, heart ailments) over the years for country show decline in number of cases [5]
30 Trends showing malnourishment/undernutrition in country are declining
31 Trends showing overnutrition/obesity in country are declining
32 Prevalence of micronutrient deficiencies show reduction in trends
33 Indicators to measure social, environmental and economic impact exist

O. Sustainability

[3] "Food Security Indicators" (Food and Agricultural Organization of the United Nations, 2018; http://www.fao.org/economic/ess/ess-fs/ess-adata/en/#.XQqMPohKg2w).
[4] Y. Zhu, International trade and food security: conceptual discussion, WTO and the case of China. *China Agricultural Economic Review*, **8**, 399-411 (2016).
[5] C. Alemayehu, G. Mitchell, J. Nikles, Barriers for conducting clinical trials in developing countries- a systematic review. *International Journal for Equity in Health*, **17**, 37 (2018).

1 **The food value chain in the country is sustainable for adequate nutritious food**
2 The political aspects concerning the food system are sustainable
3 International policies affecting food import-export are well-defined and sustained over the long term
4 Policies for food security and access to adequate nutrition are sustainable and enable long term development in the country
5 Organizations and institutions that run the food system are well established in the political system and function sustainably
6 Administrative bodies responsible for components of food delivery system function sustainably
7 Entities responsible for policy development on food security are sustainable
8 Entities responsible for food workforce training function sustainably
9 Entities responsible for financing the food security and nutrition delivery system are sustainable
10 Entities responsible for evaluation of quality and nutritional value of food delivered are sustainable
11 Entities responsible for infrastructure growth and expansion with regard to food delivery are sustainable
12 Entities managing communication among stakeholders function sustainably
13 Communication channels used to spread awareness among populations are sustainable
14 Regular communication patterns are established
15 Miscommunication via parallel communication channels is blocked

16 Non-partisan structures that span changes in leadership guide the food system
17
18 Operations activities within the food system are sustainable
19 Food sourcing mechanisms in place are sustainable
20 Diverse nutrient rich food (e.g. crops, livestock, fisheries) is sustainably sourced to meet population needs
21
22 Land available for use for arable farming purposes is sustainable for current and future use
23 Current and future population projections are taken into account to ensure sustainability
24 Land holdings are protected
25 Sustainability of soil fertility is ensured
26 Practices that promote long-term soil fertility are promoted and implemented (e.g. crop rotation techniques, fertilizing techniques, precautionary measures, changing existing harmful practices)
27 Sustainability of water for farming is ensured
28 Techniques to overcome climate variations are implemented (e.g. through water storage or controlled water use techniques)
29 Efficient and sustainable irrigation techniques that minimize water wastage are implemented
30 Efficient water storage techniques are implemented
31 Water conservation techniques are implemented
32 Disease prevention mechanisms are in place for crops, livestock, fisheries
33 Sustainability of technology implemented in farming is ensured
34 Technology and methods of farming are updateable
35 Agroforestry, afforestation and reforestation techniques are promoted for environmental sustainability
36 Infrastructure capacities can be expanded through sustainable means (use can be increased/improved where required)
37 Crop harvest and seed projections, infrastructural needs and equipment are used for evidence-based planning and budgeting for food security
38 Systems in place to produce agricultural equipment are self-sustainable (e.g. shovels, planters, tractors, livestock maintenance equipment)
39 Supply chain for farming technology is robust and sustainable

40 Variations in food produced by the country and food available externally are annually adjusted to maintain sustainability of food
41 Variations in economic conditions within the country do not adversely impact food sourcing
42 Variations in regional produce can be nullified through efficient distribution techniques
43 Foods produced in excess of country's requirement are exported
44 Methods to improve efficiency in food production are utilized (e.g. implementing mixed farming techniques and utilizing animal waste as manure for plants)
45 Food processing units/plants are sustainable
46 Food processing units/plants are economically sustainable
47 Food processing units/plants produce foods that have sustainable demand
48 Food processing units/plants have sustainable input in the form of raw material/ fresh produce
49 Food processing units/plants sustainably produce outputs
50 Food processing units/plants maintain the quality of food produced
51 Food processing units/plants have sustainable workforce where required
52 Food processing units/plants can accommodate variations in availability of raw material
53 Food processing units/plants can accommodate variations in climatic conditions that may affect processes implemented
54 Food processing units/plants can accommodate variations in financial conditions
55 Storage and distribution systems promote sustainable delivery of adequate nutritious food to the people
56 Wastage of food due to inadequate maintenance is overcome
57 Quality of food is maintained sustainably until food reaches consumer
58 Care is taken to avoid aflatoxin infestation in food
59 Safe preservative measures within established standards are implemented
60 Infrastructure capacity can be expanded or improved to include facilities that promote minimization of food spoilage (e.g. use of refrigerators to store milk)
61 Sustainable workforce required for operation of storage facilities exist
62 Sustainable workforce required for distribution exists
63 Storage facilities are economically self-sustainable
64 Distribution facilities are economically self-sustainable
65
66 The food system in the country is economically sustainable

67 The food system in the country is economically sustainable at the government/national level
68 Budget allocations towards the food sector
69 Government subsidies for food sector
70 Non-monetary asset allocation
71 Manage agri-business loans effectively
72 Currency value is maintained
73 Agri-business friendly regulation is passed and enforced
74 The food system in the country is economically sustainable at the regional level
75 Between-region economic dependence and parity are maintained
76 Labor relations between regions are well defined and maintained
77 Between-region taxation laws are economically viable
78 Between-region shared resources are economically balanced
79 Between-region produce sales are promoted and economically taxed
80 Between-region dispute resolution is economically achievable
81 The food system in the country is economically sustainable at the community, household, and individual levels
82 Household income levels is sufficient and appropriately managed for food purchase
83 Households have access to government subsidized food markets
84 Household agri-businesses are economically sustainable
85 Average household food wastage is minimal
86 Individuals are inclined to purchase locally sourced foods
87
88 The food system in the country is environmentally sustainable
89 Environmental sustainability is maintained in the food system at the government/national level
90 Environmental impacts of activities are measured according to a standard
91 Resource conservation practices are promoted and rewarded
92 Natural resources are conserved by maintaining balance of cash and non-cash crops production
93 Wildlife and biodiversity are protected by regulation (E.g., laws on overfishing to avoid depleting fish populations, anti-deforestation laws)
94 Pollution of natural resources is penalized
95 Rapid population growth checks are in place
96 Government is a stakeholder in international treaties on conservation

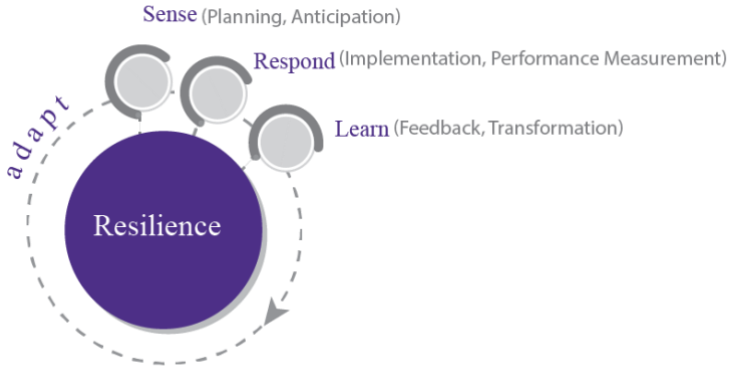
97 Environmental sustainability is maintained in the food system at the regional level
98 Regional climate adaptation practices exist and are operational
99 Intra-region transportation is environmentally sustainable
100 Reliance of food systems on non-renewable resources is consistently reduced over time
101 Environmental sustainability is maintained in the food system at the community, household, and individual levels
102 Individuals actively participate in environment conservation
103 Average household food wastage is minimal
104 Community observes waste-management practices
105 Community supports efforts to suppress illegal trade of food resources (e.g., poaching, illegal fishing)
106
107 Educational processes and trainings associated with the food system sustainably produce a capable workforce
108 Educational training for continuous inflow of workforce exists
109 Sustainability training for current and future officials exists
110 Educational training for management of cultural disparity exists
111 Educational training to manage multi-lingual issues exists
112 Competency/capacity building training programs are sustainable (E.g., extension programs)
113 Food system sustainability awareness is fostered in the community and households
114 Engagement of population and interest in available education programs is sustainable
115
116 The technological aspects of the food system are sustainable
117 Government support for technological growth and advancement exists
118 Government supports technological improvement through import of latest technologies in food/for the food system
119 Government fosters home-grown technologies through incentives and investments
120 Government allocates budget towards research and development for technological improvement
121 Regional support for technological growth and advancement exists
122 Affluent populations invest in regional technological ecosystems that support the food system
123 Tax waiver programs for new technological commercialization exist
124 Individuals are encouraged to increase technical competence

125
126 Sustainability in the food system is maintained through consistent positive attitudes and behaviors (positive psycho-sociology) in the country
127 Stakeholders within the food system are motivated to continuously generate improvements within the system
128 Individuals/communities that have chosen healthy food options are encouraged to maintain their engagement
129 Motivated leaders sustainably support the delivery of adequate, diverse nutritious food for all households
130 Households in communities advocate consumption of healthy food among all members of the household
131 Households and communities may observe improvements in health of families who consume healthy, nutritious food
132 Food supply chain workforce is motivated to continue improving and facilitating delivery of good quality, nutritious food for all
133 Partners continue to engage in food delivery system
134 Private sector partners continue to engage in food delivery system
135 Non-profit organizations continue to engage in food delivery system
136 Communities are presented with opportunities to volunteer and/or engage in the food delivery system
137 Existing food producers are motivated to improve their techniques
138 Food producers with insufficient yield are motivated to learn and implement methods to attain subsistence farming status
139 Subsistence farmers are motivated to learn and implement techniques to obtain surplus yield that can then be sold to meet local foods deficits
140 Large-scale food producers in the region are motivated to learn and implement techniques that allow them to perform commercial farming or export their goods
141
142 Physiological fitness of individuals is maintained/consistently improved through consumption of adequate nutritious food
143 The outcomes of providing adequate, good quality food to the population can be measured
144 Existing solutions are driving a year over year reduction in the underweight population

145 Existing solutions are driving a year over year improvement in child health (e.g. decrease in infant mortality rate, decrease in mortality rates of children under the age of five)

146 Provision of access to adequate food and nutrition promotes health equity among communities

P. Resilience



1 **Events that can disrupt the food value chain can be overcome (E.g., disasters; extreme climatic conditions like droughts or floods; diseases and epidemics)**

2 Sensing mechanisms exist

3 Mechanisms to plan for shocks or stressors that might impact the food system exist

4 Country is equipped with social safety nets at national and regional levels

5 Government policies and guidelines on response to stressors are in place

6 Food supply chain components have contingency plans in place to prepare for and respond to different types of shocks and stressors

7 Plans take into consideration characteristics of shocks/stressors that most frequently impact region/food value-chain component (E.g., fertilizer subsidies during crises; emergency stockpiles; food for work/cash for work)

8 Mechanisms to anticipate shocks or stressors that may impact the food system exist

9 Mechanisms to sense the onset of shocks/stressors exist
10 Mechanisms to communicate the onset of shocks/stressors to relevant food system stakeholders exist
11 Awareness of shock/stressor onset informs preparation and response within the food system
12 Response mechanisms exist
13 Awareness of shock/stressor onset informs preparation and response within the food system
14 Preventive measures are in place to overcome frequently occurring shocks/stressors in the region (E.g., infrastructure to store water and practices of rainwater harvesting and/or drip irrigation to overcome the effects of droughts)
15 Supporting infrastructure to protect population from impacts of commonly occurring shocks/stressors exist
16 Supporting practices to protect population from impacts of commonly occurring shocks/stressors exist
17 Stakeholders are aware of appropriate response practices for different types of shocks that may occur in the food system (E.g., beneficiaries, government/local leaders, workforce, private sector partners, NGOs)
18 Stakeholders perform appropriate actions during the onset of a shock or stressor (E.g., engaging a negotiator to address conflicts, taking shelter during a hurricane, avoiding supply routes prone to landslides during monsoon)
19 Workforce to assist with response to shocks/stressors is in place
20 Police services for immediate response to stressors are in place
21 Ambulance services for immediate response when required are in place
22 Fire brigade services for immediate response to crises situations are in place
23 Learning mechanisms exist
24 Feedback provision mechanisms and feedback culture exist
25 Mechanisms to enable recovery and transformation after the occurrence of shocks/stressors in the food system exist
26 Mechanisms that enable learning from shocks/stressors that adversely impact a region exist
27 Supportive agents (e.g., Government, NGOs, neighboring communities/regions) that enable recovery are operational