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Market Functionality Index

Technical Guidance

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MARKET FUNCTIONALITY INDEX

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The **Market Functionality Index (MFI)** is a quantitative measure designed by WFP's Research, Assessment & Monitoring (RAM) and Supply Chain (SC) Divisions to benchmark market functionality along the following nine dimensions: 1) Assortment of essential goods, 2) Availability, 3) Price, 4) Resilience of supply chains, 5) Competition, 6) Infrastructure, 7) Services, 8) Food quality, and 9) Access and protection.

The MFI will be part of WFP's new Business Process Model for cash-based transfers. Specifically, it is expected to be used during the intervention design phase in the process 'Market assessment and risk identification', which is one of several feasibility assessments informing the choice of transfer modality. Additionally, it is supposed to be applied also during the delivery phase in the process of 'Market situation monitoring' to detect changes in market functionality over time.

The MFI (**α-*version***) was tested in Djibouti, Iraq, Mali, Zimbabwe, Haiti, and Malawi between August and October 2019.

The current version of the MFI (**β-*version***) is being tested in Bangladesh, Nigeria, Mauritania, Bolivia, Democratic Republic of Congo, Mozambique, Zambia, Iraq, and Syria between January and April 2020.

Following the COVID-19 crisis, a **reduced version** of the MFI administered with mobile calls has been developed and is being tested in Cameroon, Chad, Central African Republic, Iraq and Nigeria as of April 2020.

1. Rationale

Why does WFP analyse markets?

WFP analyses markets to

1) understand how markets can help households achieve food security and meet their essential needs;
2) assess feasibility, risks and impact of WFP's interventions; and
3) understand how local markets can be strengthened.

Markets are widely acknowledged to play a paramount role in enhancing people's livelihoods, promoting food security and enabling them to meet their essential needs. Amartya Sen's 'Entitlement Approach' provides the theoretical underpinning for this with its insight that mere availability of enough food does not imply that vulnerable households have enough to eat (Sen, 1981).[1] The ensuing need to understand a market – have baseline information on its functionality, recognize its role for food security and

[1] The approach looks at the full range of goods and services that a person can acquire ('entitlement set') by converting assets and resources, including labour power ('endowment set'). This can involve buying food, growing food, working for food, and being given food (or, 'trade-based', 'production-based', 'own-labour' and 'inheritance and transfer' entitlements).

vulnerability and the effect of a possible shock – made market analysis one of the cornerstones of food security and vulnerability analysis in WFP (WFP, 2009a).

Over the last decade, markets have also gained a critical role in the implementation of assistance. WFP has embraced a broad range of instruments that rely on functioning markets, particularly through cash-based transfer programs. When beneficiaries receive cash or voucher transfers to purchase goods in the local market, several pressing questions arise. Are market-based interventions conducive to achieving food security and meeting essential needs? Is there enough safe food at affordable prices? Are markets sufficiently integrated for commodities to flow from surplus to deficit areas? Do traders have contingency options in place in case of tight availability? Can traders respond to an increase in effective demand? Are market-based interventions likely to lead to rising prices? Will the local community overall (including tier two and three beneficiaries) benefit?

Going beyond this, whenever a market constraint exists WFP tries to find solutions that enable market-based programs in difficult contexts. This includes market development activities, which aim at strengthening markets by reinforcing local supply chains and improving traders' efficiency.

Market analysis involves looking at markets at different levels and from various perspectives. It draws on both primary and secondary data and can include descriptive analysis; examining price dynamics such as trends, volatility or transmission of price changes in space or along the value chain; economic modelling; analysis of macro-economic variables such as exchange rates; supply and value chain mapping; evaluation of a trader survey or key informant interviews.
Among these, activities conducted at marketplace level are jointly referred to as a **market assessment.**
In case of an in-depth exercise, a **trader survey** is often part of a market assessment. It typically relies on enumerators – trained to collect information using a pre-defined questionnaire and following a survey plan – carrying out large data collection. Alternatively, a rapid market assessment can be conducted through a checklist approach. In this case, an experienced market analyst gathers information from **key informants**. Combining both approaches is also common.
Based on a specific trader survey, the **MFI** borrows from techniques prevalent in market assessments with a trader and market questionnaire. Standardized processing of the questionnaire data results in the index, which speaks to all three key objectives of market analysis.

How does the MFI relate to all of this?

With the three objectives of market analysis in mind, the MFI has been designed to provide insights into the feasibility of market-based interventions, highlighting associated risks and potential areas for market strengthening initiatives. It is further useful to monitor market functionality and, hence, access to food.

Since the beginning of market analysis in WFP, trader surveys have played a key role in understanding market functioning. They originally consisted of a trader and a market questionnaire.
Results were contextualized with key informant interviews, household and community surveys as well as secondary data such as prices to inform response option analysis (WFP, 2009b). With the increasing importance of cash-based interventions, the need for market analysis grew. However, this did not trigger a thorough rethinking of the trader survey tools. Instead, ad hoc adjustments often led to inflated tools with a huge number of questions, not always useful for the analysis and sometimes too sensitive for traders. Market assessments have since been associated with the following shortcomings:

- uncertainty about what can be achieved with a market assessment;
- lack of a standardized procedure and, thus, reliance on a technical expert to adapt the tools – undermining comparability, replicability, and objectivity of the analysis;
- lack of clarity on how to use a market assessment to inform programmatic decisions;
- heavy data collection, which slows down the process and makes it difficult to provide timely findings; and
- lack of coordination between different teams administering similar questionnaires for slightly different purposes.

The MFI has been developed to address these shortcomings. It is an indicator that can be used for market assessments that involve primary data collection. It is based on a specific trader survey (composed of a trader and market questionnaire), which must be used to calculate it. The MFI[2] overcomes the limitations of traditional market assessments by:

- focusing on the critical dimensions of market functionality, hence, satisfying the core information expected from such assessment;
- relying on a standardized survey tool and data processing, which reduces the need to deploy highly specialised staff and facilitates the expansion of WFP's workforce in market analysis and allows for comparability, replicability and more transparency;
- pinpointing market constraints and, as it is standardized and comparable across time and space, permitting to establish an evidence base for programmatic decisions;
- being a light tool accompanied by a package (data processing, data visualization, reporting templates) that will reduce the daunting task of conducting a market assessment; and
- being based on a joint RAM/SC trader survey module, which serves varying information needs (including on entry points for WFP's market development activities).

[2] The MFI can be defined S.M.A.R.T. (Goran, 1981), as it is a) Specific (target a specific area for improvement), b) Measurable (quantify or suggest an indicator of progress), c) Assignable (who will do it?), d) Realistic (what results can realistically be achieved?), and e) Timely (when the results can be achieved?).

The MFI at a glance

The MFI assigns the marketplace a score representing its functionality. It can be interpreted consistently across time and locations. Two concepts are critical.

In the context of the MFI, the term **market** refers to the physical location where buyers and sellers come together to trade goods and services. Such marketplace serves a population of interest and its geographical extension is determined as the area where these households buy their supplies. This implies that a marketplace can have several outlets, which do not need to be in the same location. However, a shopper needs to be able to access them within a reasonable time. If there is, for example, a fish market in one location, a vegetable market a 15-minute walk away and both serve the same costumers, these form part of the same marketplace. Each marketplace has a catchment area, which is the territory across which it attracts customers. Road network, topography, land cover and specific restrictions of movement determine the extent of this area.[3]

While this understanding of a market is not limited to the mere physical location and includes "the way the commodity is produced, transported, bought, and sold, but also the formal and informal institutions, rules, and norms that govern these interactions and the infrastructure that facilitate them" (IRC, 2014), it differs from the concept of a commodity market without reference to a specific location. For instance, the "market for rice" in western Africa doesn't refer to one defined location in western Africa where rice is traded but rather to economic conditions, actors and relationships that dictate the production, distribution and sale of rice in the region (WFP, 2011).

While the concept of **market functionality** is complex, we recognize that a market functions well if a) the features influencing the behaviour of buyers and sellers are stable and predictable, b) the interactions between sellers, and between sellers and buyers are transparent, and c) supplies are sufficient, regular and predictable at affordable, stable and predictable prices (WFP, 2011). While alluding only to functionality in its name, the MFI also measures aspects of market efficiency, for example, the level of competition, the state of market infrastructure or food quality.

The MFI's different dimensions evaluate these features by means of straightforward questions that can be answered either with a 'yes' or a 'no', both for the trader and the market questionnaire. Answers are aggregated by dimension, resulting in a value

[3] We can define a market catchment area either anecdotally in the marketplace by asking where household come from to key informants, or using the following mapping method: a) determining the shortest travel time (accounting for distance) from each location on the map to the nearest market, taking into account the different travel speeds influenced by terrain (land cover e.g. forest, grassland, rivers, mountains) or man-made road surfaces (e.g. tarmac road vs. track) or barriers encountered (e.g. national borders). The model highlights locations with greater accessibility problems, which may hence be more prone to chronic poverty and food insecurity, and where markets may function less well; b) All locations that have a shorter travel time to one particular market than to any other are classified as one catchment area. The assumption is that people within this area naturally refer to the closer (in terms of time) market.

between zero (low functionality) and ten (high functionality). The MFI is a combination of these intermediate scores, ranging from zero to ten as well.

The common scale allows to compare a wide range of marketplaces, some of which barely, others highly functional. The analysis of intermediate scores remains insightful to disentangle the drivers of a market's functionality and identify possible risks and opportunities associated with market-based interventions.

What the MFI can and cannot do

1) The MFI strikes a compromise between capturing a complex phenomenon and gathering information through a tool as light as possible. The indicator provides the minimum required evidence to support operational decisions. While the MFI can be taken as the basic building block of a market assessment, further components – such as a supply or value chain mapping, advanced price analysis or an assessment of beneficiary demand behaviour – might be added to contextualize the results and give a more thorough understanding of the market.
2) More functional markets are generally better prepared for cash-based interventions than less functional ones. We cannot confidently assume the latter to reliably deliver goods to beneficiaries, leaving in-kind assistance as an alternative.[4] Since the MFI has so far only been piloted in a few countries, it is premature to make a well-grounded proposal for thresholds distinguishing between indicator levels associated with different transfer modalities. Nevertheless, the MFI allows to order markets according to their functionality, suggesting which ones are best or least suited for various modalities from a market perspective. This then feeds into the decision on transfer modality, which is the result of different considerations with market feasibility being one of them (WFP, 2018a). It is only in combination with other contextual information that risks and opportunities associated with different transfer modalities can be properly identified.
3) The MFI is based on a trader survey tool. Unlike previous market assessment tools, **this tool must not be adapted to the local context**. Every single question in the tool is there for a specific reason and its answer contributes to the final score. As a result, any change will jeopardize the MFI's capacity to monitor how market functionality evolves and to assess how one marketplace performs relative to another.
4) Should the context require additional marketplace-level information, further modules or questions can be added to the MFI's trader survey tool (e.g. a price data collection module). However, a longer questionnaire can compromise data quality; traders might be unwilling to sit through a lengthy interview instead of doing business. Keeping additional modules or questions to the minimum is, thus, paramount.

[4] However, this does not mean that there are no examples of successful cash-based interventions in market environments that do not function well.

5) The MFI is designed to assess the functionality of a market, not of individual traders. While data collected at trader-level can be screened to get a sense of potential candidates for contracting, the MFI is not intended for selecting and contracting traders for voucher operations. For this purpose, other tools are available.[5]

2. The MFI's dimensions one by one

Overview

The MFI evaluates market functionality across nine dimensions: 1) Assortment of essential goods, 2) Availability, 3) Price, 4) Resilience of supply chains, 5) Competition, 6) Infrastructure, 7) Service, 8) Food quality, and 9) Access & Protection.

The trader survey tool collects information on each of these dimensions, with answers to 27 core questions contributing to the MFI score. The tool contains additional follow up questions, which do not enter the score; these are highlighted in green in the detailed description of the dimensions below. Some of the questions are at trader-level, some at market-level and some can be answered both at trader- and at market-level.

While several questions can be answered by observing trade, shops and interactions in the marketplace, others are administered as interview questions to sampled traders. The idea is to observe as much as possible and ask about what is not visible. To create rapport with the interviewed trader and facilitate conducting the survey, dimensions are ordered to have the interview part precede walking around the store and gathering additional information by observation.

To keep the survey as simple and brief to implement as possible, we phrased each question in the easiest possible way, allowing for a binary (yes/no) answer whenever viable. An affirmative answer 'yes' can indicate a higher degree of market functionality for some questions and a lower degree for others. In the following, we call the former 'positive polarity' and the latter 'negative polarity'. Non-binary questions do not have a polarity.

The MFI survey has two different types of questions: **core questions** are numbered with A to I letters (in this guidance highlighted in red) and contribute to the final score for measuring the market functionality, while **additional questions** are numbered with an X letter (in this guidance highlighted in green) and are asked to gather additional context information but do not contribute to the final MFI score.

[5] CBT Retailer contracting survey, Retailer Onboarding and Contracting Application (ROC).

MFI core questions

A. Assortment of Essential Goods

A1. Which products are normally sold in your shop? *[Market & Trader levels, No polarity] (Enumeration: Observe & Ask)*

A2. What is the [maximum] number of distinct items on sale in this shop/any of the shops in this market? *[Market & Trader levels, Positive polarity] (Enumeration: Observe & Ask)*

B. Availability

B1. Are there products that are currently scarce in this market/shop? *[Market & Trader levels, Negative polarity] (Enumeration: Ask)*

B2. Are you/traders afraid of running out of stocks within one week from now? *[Market & Trader level, Negative polarity] (Enumeration: Ask)*

C. Prices

C1. Are there products whose prices greatly increased in the last 1 month? *[Market & Trader level, Negative polarity] (Enumeration: Ask)*

C2. If we ask you/the traders in this marketplace what the price will be in a week from now, would you/they get it right? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

D. Resilience of Supply Chains

D1. Responsiveness of supply chains

D1.1 Considering your customers' current demand, would your current stocks last at least one week? *[Trader level, Positive polarity] (Enumeration: Ask)*

D1.2 If you place an order today, do you expect to receive your products within a week? *[Trader level, Positive polarity] (Enumeration: Ask)*

D2. Vulnerability to supply chain disruptions

D2.1 Are most of your suppliers geographically located in the same place? *[Trader level, Negative polarity] (Enumeration: Ask)*

D2.2 Do you currently have more than one supplier? *[Trader level, Positive polarity] (Enumeration: Ask)*

D2.3 Does your business mostly rely upon a single supplier? *[Trader level, Negative polarity] (Enumeration: Ask)*

E. Competition

E1. Are there less than five traders in the market *(by product group)*? *[Market level, Negative polarity] (Enumeration: Observe & Ask)*

E2. Does one trader control the market *(by product group)*? *[Market level, Negative polarity] (Enumeration: Observe & Ask)*

F. Infrastructure

F1. Which of the following best describes the majority of the shops in this market/this shop? *[Market & Trader level, No polarity] (Enumeration: Observe)*

F2. Which of these features apply in/nearby this shop/market? *[Market & Trader level, No polarity] (Enumeration: Observe & Ask)*

G. Service

G1. Shopping: which of the following applies to this shop? *[Trader level, Positive polarity] (Enumeration: Observe)*

G2. Check-out: which of the following applies to this shop? *[Trader level, Positive polarity] (Enumeration: Observe)*

H. Food Quality

H1. Is food in the shops protected from exposure to water, heat, direct sunlight, pests, chemicals, or other contaminants? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H2. Are fresh fruits and vegetables in the shops well-separated from raw meat, poultry, fish or seafood?

H3. Are raw meat, poultry, fish or seafood and dairy products in the shops stored and displayed in refrigerated units that are on and working? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H3.2 Is refrigeration in the shops always working? (if electricity is not stable, do stores generally have batteries/generators for continuous refrigeration)? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H4. Are all goods in labelled containers not exceeding their "best-use-before"/ "use-by" date? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H5.1 Are processed pre-packaged foods in the shops intact and in properly labelled containers? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H5.2 Is food in the shops free of visible signs of spoilage and bad smells? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

H5.3 Are food packages intact and free from signs of decay or damage? *[Market & Trader level, Positive polarity] (Enumeration: Ask)*

I. Access & Protection

I1. How many of the following access issues are observed in this market? *[Market level, Negative polarity] (Enumeration: Observe & Ask)*

I2. How many of the following protection issues are observed in this market? *[Market level, Negative polarity] (Enumeration: Observe & Ask)*

X. Type of shop (observational questions for sampling)

In this section, we set the ground of the trader survey capturing the type of business the trader is involved in and the business volume. This is approached with the following observational questions: a) the approximate square meters of the shop, b) the number of check-out points, and c) the number of permanent employees. While this information won't be part of the MFI scoring, it can be used both for sampling, if there is interest to include in the survey different types of shops, and it is likely to be correlated with the type of services being offered in the shop and can thus be used as a triangulation source with the service dimension.

X1. Which type(s) of customers does the shop serve?

[Trader level] (Enumeration: Observe & Ask)

[ ] Households
[ ] Traders

X2. What is the approximate size of the shop?

[Trader level] (Enumeration: Observe)

[ ] Single stall (1 WFP 4X4 car does not fit inside ≈ less than 15 sqm)
[ ] Small shop (1 WFP 4X4 car fits inside ≈ 15 sqm)
[ ] Normal shop (2 WFP 4X4 cars fit inside ≈ 30 sqm)
[ ] Big shop (3 or more WFP 4X4 cars fit inside ≈ 45 sqm or more)

X3. How many check-out points/ cashiers does the shop have (incl. any type of cash register, manual or automated)?

[Trader level] (Enumeration: Observe)

Hint: Please include any type of cash registers, either manual or automated, that are in a working condition.

[ ] One
[ ] Between two and four
[ ] Between five and ten
[ ] More than ten

X4. How many employees are present in the shop?

[Trader level] (Enumeration: Observe)

[ ] One
[ ] Between two and four
[ ] Between five and ten
[ ] More than ten

A. Assortment of Essential Goods

The **assortment of essential goods** dimension brings together concepts from two different disciplines. The reference to essential goods builds on WFP's work on 'essential needs', which is linked to development economics, while 'assortment' is a topic discussed in marketing.

Essential needs refer to what households require to ensure minimum living standards without resorting to negative coping mechanisms or compromising health, dignity or crucial livelihood assets. These include both goods and services such as food, shelter, basic household items, safe drinking water, sanitation and hygiene or healthcare. For the purpose of the MFI, we concentrate on essential goods, ignoring services; and among

these only on essential goods which households acquire in the market. Shifting the focus from a few specific products to all essential goods available in the market reflects the shift from food aid to food assistance, where the extensive use of cash-based transfers allows beneficiaries to address bundles of needs (WFP, 2018b).

The retail/marketing literature has given the term 'assortment' different meanings. This includes an interpretation as the total merchandise on sale in a store (store assortment) as well the choice within individual merchandise groups, determined by allowing for some degree of substitution[6] among products (category assortment). The store assortment captures different product classes or categories, the number of product lines within each category and the number of variants for each of these product lines[7] – or stock-keeping units (SKUs). Meanwhile, the category assortment focuses on the latter (Hart and Rafiq, 2006).

The MFI considers whether three different basic product categories – cereals, food items other than cereals and non-food items (NFIs)[8] – can be found in the market; and includes an estimate of the maximum number of SKUs sold in any of the outlets in the market, i.e. the maximum level of store assortment. While commodity-specific questions are not part of this core information with an effect on the market's score, additional follow up questions allow capturing context-dependent challenges related to individual commodities. In this way, the MFI tool flags issues related to market functioning for the three broad categories in a first step; and digs deeper in a second step only if relevant.

Such flexible scheme is an innovation in trader surveys, which typically zoom in on one key commodity (a cereal in most cases); and get very lengthy as soon as there is a need to look beyond a single commodity. Adaptability is key for a tool intended to be used across very diverse countries. First, what constitutes an essential good depends on the local context. For example, while a warm blanket is essential in the snow, it is not necessary in a tropical country. Second, it allows assessing different types of marketplaces, from very simple ones where it is paramount to get information on a specific commodity (e.g. maize in several rural markets in Southern Africa region), to those where a wider assortment is being sold (e.g. Lebanon).

The **assortment of essential goods** dimension indicates which classes of goods to meet essential needs can be purchased in a marketplace and how much choice is offered.

[6] Consumers can choose between product categories that satisfy separate, fairly basic needs and are complementary in the purchasing situation (Kristenson, 1983).

[7] The 'width of an assortment' is associated with the number of different product categories. The number of product lines within a category is also called the 'breadth of the assortment', whereas the number of variants within product lines is referred to as the 'assortment depth'. In addition, 'assortment consistency' captures the relatedness of product classes on sale (Hart and Rafiq, 2006).

[8] NFIs cover water, sanitation & hygiene (WASH); health; shelter; household items; education; and communication goods.

A1. Which products are normally sold in this shop/market?

[Market & Trader levels, No polarity] (Enumeration: Observe & Ask)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

If cereal food is selected, choose all that apply:

[Y]/[N] - Rice
[Y]/[N] - Maize
[Y]/[N] - Cassava
[Y]/[N] - Wheat
[Y]/[N] - Flour
[Y]/[N] - Pasta
[Y]/[N] - Bread
[Y]/[N] - Sorghum
[Y]/[N] - Millet
[Y]/[N] - Barley
[Y]/[N] - Other (please specify)

If other food is selected, choose all that apply:

[Y]/[N] - Roots and Tubers (e.g. Cassava, Potatoes, Yam, etc.)
[Y]/[N] - Legumes, Nuts and Seeds (e.g. Beans, Peas, Lentils, etc.)
[Y]/[N] - Fruits and Vegetables
[Y]/[N] - Milk and Dairy Products
[Y]/[N] - Meat, Fish and Eggs
[Y]/[N] - Oils and Fats
[Y]/[N] - Herb, Condiments and Spices
[Y]/[N] - Other (Please specify.)

If NFI is selected, choose all that apply:

[Y]/[N] - **WASH** - Drinking water, purification tablets
[Y]/[N] - **WASH** - Latrine construction materials
[Y]/[N] - **WASH** - Hygiene NFIs (toilet paper, toothbrush, toothpaste, laundry detergent, liquid dish detergent, sanitary napkins, individual soap)
[Y]/[N] - **Health** - Medicine (over-the-counter pharmaceuticals)
[Y]/[N] - **Shelter** - Shelter items (tents, plastic sheeting, metal sheet, tarpaulin, temporary shelters, etc.)
[Y]/[N] - **Shelter** - Constructing materials (bricks, bamboo, etc.)
[Y]/[N] - **Household items** - Clothing including shoes
[Y]/[N] - **Household items** - Bedding (bed nets, blanket, floor mat/mattress, ground insulation, mosquito nets)
[Y]/[N] - **Household items** - Cooking and eating utensils
[Y]/[N] - **Household items** - Stoves, fuel and lighting (e.g. LPG, Gas, Firewood, Charcoal, Solar)
[Y]/[N] - **Education** - School material (Schoolbooks, Stationary, Uniforms)
[Y]/[N] - **Communication** - Mobile phones/SIM cards/services and internet

A2. What is the [maximum] number of distinct items on sale in this shop/any of the shops in this market?

[Market & Trader levels, Positive polarity] (Enumeration: Observe & Ask)

[ ] Between 1-50
[ ] Between 51-200
[ ] Between 201-1,000
[ ] More than 1,000

Hint: By distinct item (or stock keeping unit), we mean a distinct type of item for sale in terms of manufacturer, material, size, etc. For instance, a gas stove from the same manufacturer but in two different colours (one in GREEN, another in WHITE) would be two distinct items. For items sold in bulk (e.g. cereal grains or pulses), a different variety or quality grade can be considered as a different SKU.

B. Availability

Adequate supplies are an essential feature of well-functioning markets. Availability, the physical presence of goods in sufficient quantities, is directly linked to this. Domestic production, imports and, in case of food, carry-over stocks as well as humanitarian assistance – in short, supplies – determine the physical presence of goods. Demand, on the other hand, gives meaning to the qualification 'in sufficient quantities'. The presence of one tonne of rice might be more than enough to meet the demand of a certain population, while not nearly adequate for a population twice that size or with different dietary habits.

The marketplace is one of the key locations for supply to meet demand and critically influences availability through different channels (WFP, 2011). Markets serve farmers to procure inputs and to distribute their produce, enabling them to earn money from and, thus, incentivizing production. Availability further depends on traders' capacity to move goods across space and time, resulting in a flow of supplies from surplus to deficit areas or from harvest to lean season as stocks.

What quantities are reasonable is, of course, a judgement call. We implicitly ask traders to make the judgement call for us and consider how components of availability – for example, domestic production, household requirements or trade – interact by asking about the scarcity of products (question B1) and the odds of running out of stocks soon (question B2).[9] The first question sets supply in relation to normal demand, whereas the second relates to traders' concerns of not being able to adjust their supply because of excessive demand pressure or forthcoming seasonal issues.

The **availability** dimension assesses whether certain products are scarce or likely to get scarcer in the short run.

[9] The question about being afraid of running out of stocks addresses some of the inherent limitations of one of the most frequently asked questions in trader surveys, namely 'Would you be able to supply if the demand increases by 50 percent?'. This question is vague and can generate the expectation that a positive answer could lead to additional business opportunities should humanitarian agencies stimulate demand with market-based transfers.

B1. Are there products that are currently scarce in the market/shop?

[Market & Trader levels, Negative polarity] (Enumeration; Ask)

Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower availability

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

If selected, please specify the product.

B2. Are you/traders afraid of running out of stocks within one week from now?

[Market & Trader levels, Negative polarity] (Enumeration; Ask)

Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower availability

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

If selected, please specify the product.

C. Prices

Affordable, stable and predictable prices are a key characteristic of well-functioning markets. It is only when goods are exchanged at affordable prices that markets provide poor households with not just physical but also economic access to essential goods. High prices can have a detrimental effect on food security for vulnerable households, who typically spend a large share of their income on food (Aksoy and Isik-Dikmelik, 2008; Brinkman *et al.*, 2010; Ivanic and Martin, 2008). Volatile and unpredictable prices, in turn, undermine economic decision making, for consumers but even more so for producers. These often face large income fluctuations without having safeguards such as credit or insurance to buffer them, putting productive activities at risk and postponing investments decisions (FAO, 2011).

Apart from being critical to the functioning of markets, prices dynamics also contain important information on the regularity of supplies or how different events impact these. They reflect market participants' expectations regarding supply and demand and their confidence or uncertainty. As an example, flooding can lead to upward price adjustments if it makes roads unpassable, lowering expectations about future supply. However, if the consequences of the flooding are highly uncertain, prices might become more volatile. Similarly, prices can change due to macro-economic developments, natural or human-induced disasters or price movements on global commodity markets (WFP, 2017).

The price dimension of the MFI measures two basic features of prices, trend (question C1) and volatility (question C2). The first is associated with affordability and the second with stability and predictability. We ask whether prices (of one or more commodities) have been on the rise in the last month to get a sense of the price direction. Regarding

volatility, the critical aspect is unpredictability rather than variability itself. In markets with high seasonal changes, volatility can be largely predictable and, thus, not necessarily harmful because market players can put in place contingency plans. For this reason, we ask traders if it is easy for them to have a sense where prices are headed within the next week.

Establishing a sustainable price monitoring system is the golden path for tackling a wider array of information needs.[10] Whenever the MFI is applied in a marketplace where no historical price data exists it can return some minimal information about trend and volatility. In addition to that, a module for collecting prices of specific goods (and brands) can complement the survey. In the likely case of existing price data, a more rigorous price analysis can be useful to triangulate the results of the MFI's price dimension.

The **price** dimension assesses price trends and volatility. Both rising prices and excessive volatility show that the market is not functioning well.

C1. Are there products whose prices greatly increased in the last one month?
[Market & Trader levels, Negative polarity] (Enumeration: Ask)
Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates higher price instability. The time reference can be changed as well.

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

If selected, please specify the product.

C2. If we ask you/traders in this marketplace what the price will be in a week from now, would you/they normally get it right?
[Market & Trader levels, Negative polarity] (Enumeration: Ask)
Note: the polarity is positive, provided 'yes' indicates lower price instability

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

If selected, please specify the product.

[10] Including: "Monitoring food security to generate cost-of living indicators, and supporting early warning through price alerts; Providing information for cash-based transfers, including the value of the standard food basket for value vouchers, or expected household expenditure patterns for cash transfers, plus information for adjusting transfer values; Contracting retailers and informing WFP's retail strategy; Monitoring inflationary trends and comparing prices with shops not directly involved in WFP programming, hereby monitoring the impact of WFP's interventions on local markets; Assessing the impact of policies, programmes and projects, and modelling food security outcomes using prices as shock factors; Informing decisions over the timing and location of WFP procurement (e.g. local/regional purchase); Assisting (small-scale) farmers with agricultural planning and marketing decisions, including insurance premiums and pay-outs; and Increasing information and transparency for producers, traders and consumers to improve market efficiency" (WFP, 2017).

D. Resilience of Supply Chains

Regular supplies are vital to market functioning. They depend on the resilience of the underlying supply chains, that is, how vulnerable these are to disruptions; how quickly they can respond; and how much time it takes to overcome the issues or adjust to a new situation. In many countries where WFP operates, potential supply chain disruptions are among the most relevant concerns before implementing cash-based transfers; not least because such interventions put additional pressure on supply chains.

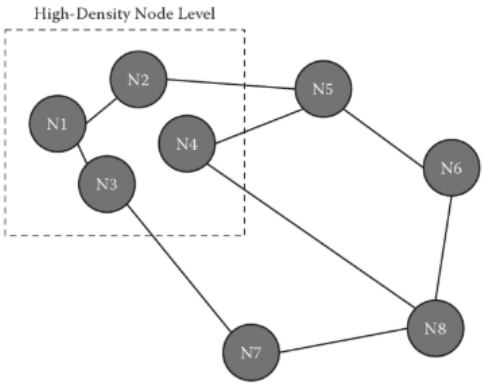
The MFI assess supply chain responsiveness through **lead time** (Chang and Lin, 2019). Lead time is the sum of supply delay (How long does it normally take to your suppliers to deliver the goods once an order is placed?) and re-ordering delay (How often does your supplier accept re-orders?). A shorter lead time enables the trader to adjust to changing demand more rapidly and be aware of upstream supply chain disruptions earlier, resulting in more time and flexibility to put in place contingency measures (question D1.1).

A shorter lead time is typically associated with lower **stocks**. As Chang and Lin, 2019, argue, the faster an order replenishment is, the lower the optimal safety stock required to hedge against demand uncertainty (Chopra, Reinhardt and Dada, 2004; Song *et al.*, 2010) since a shorter lead-time enables firms to dynamically respond to the shifting customer demand and provides less incentive for them to hold excessive inventory on-hand (Finke, Singh and Schönsleben, 2012). While lower stocks are in this way often linked to higher supply chain responsiveness, larger inventories can buffer the immediate impact when traders struggle to source new supplies, making the supply chain less vulnerable to disruptions (Song, 1994) even though it can intensify inventory inefficiency (Agrawal, Sengupta and Shanker, 2009). The MFI, thus, takes a separate look at buffer stocks, rating their level as adequate or not (depending on whether it is enough to cover one week or not) from a preparedness perspective (question D1.2).

A **network** perspective can be useful to further analyse a supply chain's exposure to disruptions (Harland, Brenchley and Walker, 2003). When thinking of a supply chain as a network, nodes resemble all different entities involved from, for example, farmers growing wheat to a retailer selling bread. These can include wholesale traders, warehouse managers, millers, truck drivers, retailers and others involved in getting from the starting to the final point, that is, from the wheat farmer to retailer in the example. An arc between two of the network's nodes indicates that there is a relationship between these two entities. Three network characteristics are particularly helpful in revealing vulnerabilities – density, complexity and node criticality (Craighead *et al.*, 2007).

Density (question D2.1) refers to the geographical spacing of nodes within a supply chain network: the smaller the spacing, the higher the density. With more of its entities clustered within a small geographic area, supply becomes more vulnerable to (natural) disaster-related disruptions.

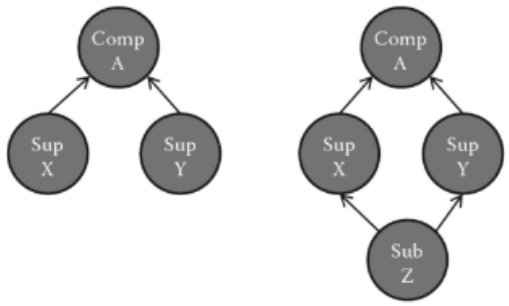
Figure 1: Different density levels of a network



Source: Harbour, 2017

Complexity (question D2.2) refers to both the number of supply chain nodes in a network and the interconnections between those nodes, with an increasing number of nodes and arcs characterizing an increasingly complex network. The advantage of such network is that it is more likely to offer excess pathways (e.g. a company having more than one supplier) which can be used if a node (e.g. a supplier) fails. However, Figure 2 shows that a higher number of nodes alone does not guarantee this. Company A sources from two different suppliers, X and Y, that is, can re-stock through Y should X run short on supplies (left-hand side). But, looking more thoroughly (right-hand side), it becomes clear that both supplier X and Y source from the same sub-supplier Z. If this sub-supplier cannot deliver, then this problem will affect both supplier X and Y simultaneously.

Figure 2: Network complexity



Source: Harbour, 2017

Node criticality (question D2.3) refers to the relative importance of a node or set of nodes within a network and is context-specific. Craighead *et al.*, 2007 elaborate that "each node within a supply chain, in theory, should play a value-adding role and, as such, is important by nature. Even then, some nodes may be deemed to be more important than

others, simply because of what they do and/or what their relative contribution is to value. For example, a node responsible for a critical component (e.g., critical supplier) would itself be more important (and, hence, more critical) than a node that handles a noncritical component. Alternatively, a node responsible for integrating many equally valued parts into a large component (e.g., subsystems supplier) would be more critical than one that integrates fewer parts of equal value. Similarly, a node that distributes materials to many other nodes within the same chain (e.g., distribution centre) would be more critical than one that simply distributes materials to a few other nodes." Therefore, disruption of a critical node has more severe consequences.

The **supply chain resilience** dimension evaluates both responsiveness and vulnerability of supply chains. Resilient supply chains underpin the regular supply of a market with goods despite potential disruptions, which is essential to a well-functioning market.

D1. Responsiveness of the Supply Chain

D1.1 Considering your customers' current demand, would your current stocks last at least one week? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Ask)

(Note: the polarity is positive, provided 'yes' indicates higher supply chain resilience. The week benchmark can be adjusted. It was set to return a short-enough time benchmark during which stocks would exhaust if no additional supplies would come over)

D1.2 If you place an order today, do you expect to receive your products within a week? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Ask)

(Note: the polarity is positive, provided 'yes' indicates higher supply chain resilience. The week benchmark can be adjusted. It was set to return a short-enough time benchmark during which stocks would exhaust if no additional supplies would come over)

D2. Vulnerability of the Supply Chain to Disruptions

D2.1 Are most of your suppliers geographically located in the same place?

[Trader level, Negative polarity] (Enumeration: Ask)

(Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower supply chain resilience)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

[For each product group] If your supply was total 10 in the past month, how much of your supply came from the following places:

[ ] *[administrative unit 3]*
[ ] *[administrative unit 2]*, outside of *[administrative unit 3]*
[ ] *[administrative unit 1]*, outside of *[administrative unit 2]*
[ ] Within the country, outside of *[administrative unit 1]*
[ ] Foreign countries

D2.2 Do you have currently have more than one supplier?

[Trader level, Positive polarity] (Enumeration: Ask)

(Note: the polarity is positive, provided 'yes' indicates higher supply chain resilience)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

D2.3 Is there a single supplier from whom most of your business relies upon?

[Trader level, Negative polarity] (Enumeration: Ask)

(Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower supply chain resilience)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

E. Competition

Competition among market participants characterizes an efficiently functioning market. This dimension investigates if the business environment is conducive to fair competition, which is typically the case when there are enough traders in the marketplace and none of them has a dominant position. These two conditions should lower the risk for few traders to build an oligopolistic cartel, set prices and profit disproportionally from a potential introduction of cash-based transfers.

A widely accepted measure of competition is the Herfindahl-Hirschman Index[11] (HHI) (Rhoades, 1993). The indicator takes a value between zero (high competition) and one (no competition), with values below 0.25 indicating a reasonably competitive market environment.

The measure is based on trader's shares in the market. As it is difficult to estimate these, we instead ask two simple questions which allow approximating the HHI to the extent of judging whether it is below 0.25 or not. If there are less than five traders, then the HHI is always equal to or above 0.25, even in case the market is divided evenly between the players. If there are at least five traders, however, it is a matter of the number of traders who are in control (i.e. together have more than 50 percent market share). If it is only one, then the HHI is still higher than 0.25. If it is more than one, it falls below this threshold.[12] Hence, questions E1 (Are there less than five traders in the market?) and E2 (Does one trader control the market?) allow us to infer whether the HHI is below 0.25 or not, i.e. whether the marketplace is competitive or not.

[11] $HHI = \sum_{n=1}^{N} s_n^2$, where N is the number of wholesalers or retailers that sell a specific food group and s_n is the market share of the n-th trader.

[12] For the sake of simplicity, in this case we assume that market shares are evenly distributed between (A) the traders who control the market and (B) the remaining traders.

We can compute the HHI for each of the relevant food groups at both retail and wholesale level. However, as it is unlikely to find less than five traders at retail level, we concentrate on wholesalers. We also triangulate this information by approximatively quantifying the number of vendors in a market as a complement to the MFI questions.

The **competition** dimension evaluates if the number of traders in the market and the distribution of power among them guarantee a reasonable level of competition. Competition is critical to a well-functioning market since it forces vendors to improve their efficiency and pushes prices down to the benefit of the end consumer.

E1. Are there less than five traders in the market?

[Trader level, Negative polarity] (Enumeration: Observe & Ask)

(Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower competition)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

E2. Does one trader control the market?

[Trader level, Negative polarity] (Enumeration: Observe & Ask)

(Note: the polarity is negative and needs to be inverted here, provided 'yes' indicates lower competition)

[Y]/[N] - NFIs
[Y]/[N] - Food other than cereals
[Y]/[N] - Cereal food

Hint: For cereal food, this one trader could be grain reserve board of the country.

***

X5. How many traders operate in the market?

[Market level] (Enumeration: Observe & Ask)

(Note: The list below won't be part of the MFI scoring, but it is collected to understand the size of the market)

[ ] 1
[ ] 2-5
[ ] 6-15
[ ] 16-50
[ ] 51-100
[ ] 101-500
[ ] 500+

Hint: By trader, we mean all types of petty vendors, retailers, and wholesalers.

F. Infrastructure

Adequate infrastructure underpins various facets of a well-functioning and efficient market. Very broadly, infrastructure refers to "the basic physical systems of a business, region, or nation – for instance, transportation systems, communication networks, sewage, water, and electric systems".[13]

The physical structure where the exchange of goods takes place – ranging from carriages and portable units to concrete buildings – is one of the features that influences the behaviour of buyers and sellers. A more permanent shop structure not only implies a more reliable presence of a retailer in a market, but also makes it more likely that it will survive a natural disaster and still be usable afterwards. Longer-lasting infrastructure, thus, adds to stability and predictability – one of the characteristics of a well-functioning market. The reliable presence of retailers in a fixed place further contributes to the transparency of interactions between market participants. Meanwhile, a reliable communication network can be crucial to place orders and, hence, ensure sufficient supplies.

What is more, well-developed shop infrastructure can indicate that the market is working efficiently. Access to credit and a conducive business environment, for example, make it easier to establish a solid building to house the shop. Similarly, competition sets incentives for retailers to create a customer-friendly and hazard-free shopping environment. At least in part, they can accomplish this through the provision of proper shelter. In addition, the more permanent and well maintained a shop's physical structure, the less likely the retailer is to struggle with food quality, handling or storage issues.

The **infrastructure** dimension assesses the type and condition of the physical structures which host shops in addition to, for example, sewage system, electricity or communication network. Adequate infrastructure contributes both to a well-functioning market and can be interpreted as an indication for different aspects of market efficiency.

F1. Which of the following best describes the majority of the shops in this marketplace/this shop?

[Market & Trader level, No polarity] (Enumeration: Observe)

[Y]/[N] - Poor state, severe maintenance issues
[Y]/[N] - Some structure damages, minor maintenance issues
[Y]/[N] - Good state, intact, no maintenance issues

[13] https://www.investopedia.com/terms/i/infrastructure.asp

F2. In/nearby this shop/market there is/are

[Market & Trader level, No polarity] (Enumeration: Observe & Ask)

[Y]/[N] - A closed sewage system
[Y]/[N] - A dedicated waste collection area
[Y]/[N] - Walkways and emergency exit(s)
[Y]/[N] - Shelter
[Y]/[N] - Uninterrupted electricity
[Y]/[N] - Reliable communication network (mobile phone coverage and/or internet)
[Y]/[N] - Water availability (manual pump or tap in close proximity of each vendor, i.e. max 5 min walking)
[Y]/[N] - Toilets

***

X6. Which are the structures that better/best describe this market/shop?

[Market & Trader level] (Enumeration: Observe)

(Note: The list below won't be part of the MFI scoring, but it is collected to understand how the market looks like)

[Y]/[N] - Open-air/ Portable unit (stand, vehicle, carriage etc.)
[Y]/[N] - Semi-permanent structure (corrugated iron, wooden, rub hall, etc.)
[Y]/[N] - Permanent/ Concrete building structure

***

X7. Does the shop have a Business License/Legal registration?

[Trader level] (Enumeration: Ask)

(Note: The list below won't be part of the MFI scoring. Provided this is a rather sensitive question for some traders, we suggest to ask it at the very end of the survey, even though it logically falls in this dimension)

G. Service

While not directly tied to a single characteristic of a well-functioning market, good service is evidence for different aspects of market functionality such as competition, reliability and transparency. When thinking about service, it is helpful to keep the customer value equation in mind as a starting point. According to this equation, assortment, price, quality and service determine the value of a product on a shopping occasion for a customer.

The more competitive the market environment, the higher the incentive for retailers to provide the best value to customers; otherwise, these might shop somewhere else. Conversely, this means that we can take an assortment tailored to local preferences, fair prices, high-quality products and, most importantly, good service as an indication for an efficient market environment. A retailer who displays products in a way that facilitates selection, ensures that customers don't have to queue for long when checking out or offers remote shopping has a competitive edge over others. Especially in a place where the same products are available at an equal price and a similar quality, the level of customer service offered will decide who cuts the deal.

Furthermore, details of good service such as visible price tags or automatic itemized receipts add to a market's transparency, a fundamental aspect of its functionality.

Links between service and market functionality can also be less directly evident. For example, a shop might have several employees working in shifts to ensure that there are always enough open cash registrars, avoiding long lines and speeding up check out. At the same time, this HR measure implies that the shop manager can rely on a bigger trained workforce. This comes in handy should there be a sudden increase in demand or an employee fall sick. Thus, there is an indirect association of better service with higher responsiveness and resilience of the retailer.

The **service** dimension looks at the service provided while shopping as well as during check-out. The level of service is directly or indirectly associated with different features of a well-functioning market such as transparency, competition or reliability.

G1. Shopping: Which of the following applies to this shop?
[Trader level, Positive polarity] (Enumeration: Observe)
(Note: the polarity is positive, provided a higher number of 'yes' indicates better services)

[Y]/[N] - Products are displayed such that it is easy to identify and select
[Y]/[N] - Price tags are visibly displayed (printed or handwritten)
[Y]/[N] - It is possible to purchase from this shop remotely (e.g. online shopping)

G2. Check-Out: Which of the following applies to this shop?
[Trader level, Positive polarity] (Enumeration: Observe)
(Note: the polarity is positive, provided a higher number of 'yes' indicates better services)

[Y]/[N] - The shop accepts more than one form of payment
[Y]/[N] - The waiting time at checkout is normally shorter than 10 minutes
[Y]/[N] - Itemized receipts are automatically issued (not handwritten)

X8. Which forms of payment are accepted?
[Trader level] (Enumeration: Observe & Ask):

[Y]/[N] - Cash
[Y]/[N] - Debit card
[Y]/[N] - Credit card
[Y]/[N] - Mobile money
[Y]/[N] - Informal credit (Purchase on credit)
[Y]/[N] - E-Voucher (WFP Card)
[Y]/[N] - Other *(specify)*

***

X9. Maturity: Which of the following applies to this shop?
[Trader level] (Enumeration: Observe)

[Y]/[N] - This shop appears in internet search (e.g. Google Maps, Facebook, etc.)
[Y]/[N] - The shop analyses their POS data (such as inventory data, catalogue data, etc.)
[Y]/[N] - The shop has a customer's loyalty program

H. Food quality

In many marketplaces, food may be available in sufficient quantities, but the quality of this food may vary. Availability of food unsafe for human consumption is no better – even worse, in some instances – than unavailability of food. The MFI examines food quality in combination with quantity (which is assessed in the MFI's availability dimension).

However, there is more than one way in which food quality is critical to market functionality. Speaking with the Codex Alimentarius, "foodborne illness and foodborne injury are at best unpleasant; at worst, they can be fatal. But there are also other consequences. Outbreaks of foodborne illness can damage trade and tourism, and lead to loss of earnings, unemployment and litigation. Food spoilage is wasteful, costly and can adversely affect trade and consumer confidence" (FAO and WHO, 1969).

To avoid these negative implications of foodborne illness and guarantee a well-functioning market, food businesses (producers, wholesalers, retailers and other actors along the supply chain) have the obligation to: 1) "provide food which is safe and suitable for consumption"; and 2) "ensure that consumers have clear and easily-understood information, by way of labelling and other appropriate means, to enable them to protect their food from contamination and growth/survival of foodborne pathogens by storing, handling and preparing it correctly" (FAO and WHO, 1969).

Accordingly, the MFI's questions H1, H2 and H3 assess if the marketplace conditions under which food is stored and displayed for sale do not compromise the wholesomeness and safety of those products; H4 and H5.1 check for adherence with product labelling requirements, including expiration dates; and H5.2 and H5.3 take stock of signs of product spoilage or signs of decay in items displayed for sale.[14]

The MFI assesses **food safety** against key principles of hygiene and cleanliness, material separation, temperature control and stock management. The reliable supply of products – in both adequate quantity and quality – is a key characteristic of good market functionality.

Exposure

H1. Is food in the shops protected from exposure to water, heat, direct sunlight, pests, chemicals, or other contaminants? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

[14] Properly pre-packaged foods should contain the following basic information: Name of food; list of ingredients: net contents and drained weight; name and address of supplier/manufacturer/packer; country of origin; supplier batch number; date marking; storage instructions; instructions for use (FAO and WHO, 1969).

Separation

H2. Are fresh fruits and vegetables in the shops well-separated from raw meat,[15] poultry, fish or seafood? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

Refrigeration

H3.1 Are raw meat, poultry, fish or seafood and dairy products[16] in the shops stored and displayed in refrigerated units that are on and working? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

H3.2 Is refrigeration in the shops always working? (if electricity is not stable, do stores generally have batteries/generators for continuous refrigeration)? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

Expiry date or expired product being sold

H4. Are all goods in labelled containers not exceeding their "best-use-before"/ "use-by" date? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

Spoilage

H5.1 Are processed pre-packaged foods in the shops intact and in properly labelled containers? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

H5.2 Is food in the shops free of visible signs of spoilage and bad smells? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

H5.3 Are food packages intact and free from signs of decay or damage? [Y]/[N]

[Trader level, Positive polarity] (Enumeration: Observe)

(Note: the polarity is positive, provided 'yes' indicates higher quality)

Hint: For example, cans may be rusted, dented, leaking or swollen; bags may be ripped, leaking, or damaged, or wet; plastic bottles may be deformed, bubbled, broken seals or have loose labels.

***

X10. Does the shop undergo any health certification/ inspection on hygiene or HACCP annually?

[Trader level] (Enumeration: Ask)

(Note: The list below won't be part of the MFI scoring. Provided this is a rather sensitive question for some traders, we suggest asking it at the very end of the survey, even though it logically falls in this dimension)

[15] Raw meat includes non-cooked meat of bovine, pork, goat, sheep, or other animals.

[16] Dairy products include pasteurized and non-pasteurized milk, fermented milk products (including yoghurt and kefir), fresh soft-type cheeses (from pasteurized or non-pasteurized milk), and aged hard-type ripened cheeses.

I. Access & Protection

Since markets are the physical locations where trade happens between buyers and sellers, then safe access to the marketplace is a crucial dimension of market functionality. This can be disentangled into two different components where we assess access and protection issues with an increasing level of severity.

Physical **access** is normally granted, but in many cases, the marketplace is in remote areas far away from major road networks. This has implications both for customers, who may either be forced to travel a long distance to reach it or wait for close weekly markets. Also, being disconnected from major road network is a problem for traders, as their supply chain will be more vulnerable to disruptions and they may fail to adjust their supply to changes in demand, unless they are willing to preposition contingency stocks in their warehouses. In such a situation of continued constraint access, market players will find their way to participate with large degrees of inefficiencies as in several markets in the Tete province in Mozambique.[17] Differently, access can be compounded on a seasonal basis, for instance, because of seasonal floods; depending on the predictability and extent of the event, access to the market can be a challenge, as in the case of Rumbek in South Sudan.[18] Finally, the most severe physical access constraint can occur when natural disasters hit and (partially) isolate marketplaces for a certain time, for example in the aftermath of the earthquakes that struck Central Sulawesi in Indonesia[19] and Nepal[20].

Protection issues can be another driver for limited access to the marketplace for both customers and traders. There may be social barriers for marginalized groups of people, but also physical threats for vulnerable people[21] or even targeted violence. In the worst cases, the entire market can be either destroyed or severely affected by indiscriminate

[17] **"**Mucumbura is a village on the border with Zimbabwe, nearly one hour's drive on a dirt road from Magoe and a six or seven-hour drive from Tete city. Road conditions are extremely poor and the travel time from Mucumbura to Magoe can increase to up to five hours during the rainy season. […] With favourable weather conditions, households in Mucumbura grow their own food, and the market at its full capacity can also meet the demand of nearby villages, but this is not the case this year. Farmers in Mucumbura are now increasingly reliant on markets to meet their maize and sesame seed requirements. There are 15 main retailers in the two markets of Mucumbura, in addition to several petty traders. […] Interviewed traders mentioned that they would not be able to increase supply at short notice because of distance and time constraints (WFP, 2016).

[18] Rumbek "is an example of a poorly functioning market unaffected by the conflict, but one that is limited by seasonal and infrastructural problems. At the peak of the 2014 rainy season, transporters were unwilling to lease their trucks to transport goods to Rumbek, resulting in very low market supplies and high food prices" (WFP, 2015).

[19] "Immediately following the shock, many markets closed or operated at 50 percent capacity. Poor road conditions, damaged infrastructure and unavailability of transport temporarily hampered access to markets in most locations" (WFP, Oxfam and Wahana Visi Indonesia, 2018).

[20] "Markets in both urban and rural areas are thought to have been severely disrupted. Many of the affected rural districts have very limited market access, even in normal times. The main regional markets supplying the affected areas are Bharatpur (likely to have been severely affected) and Bhairahawa (possibly less affected), which both serve as key trade hubs with India" (Nepal 72-hrs assessment, 2015).

[21] The risk of safety when accessing local markets "is specific to female single-headed households as food provision is part of the husband's responsibility in Rohingya culture. In a camp environment women do not feel safe accessing local markets as they have to break purdah, be visible to men and therefore face greater risks of sexual harassment and assault" (Oxfam, 2017).

violence.[22] In the latter case, markets normally adjust to the war economy and resume to work, for example in the conflicts in South Sudan or Northern Mali. "In both places, food was widely available for purchase in the market, and on a functional definition, markets could be said to be working. In both places, people with political or military power were using that power to restrict certain flows of goods and favour those from which they could profit" (Levine, 2017).

Access & Protection issues reduce to a large degree market functioning for certain groups of people (both customers and traders) or for everyone. These functionality lapses can be short-lived or prolonged. In the latter case, normally markets adapt to the new circumstances and manage to operate, even though with large degrees of inefficiency.

I1. How many of the following access issues are observed in this market?
[Market level, Negative polarity] (Enumeration: Observe & Ask)
Note: the polarity is negative and needs to be inverted here, provided 'yes' alludes to access issues

[Y]/[N] - Access is normally difficult because the marketplace is away from major road networks
[Y]/[N] - Access is limited in certain times of the year (e.g. monsoon, seasonal floods)
[Y]/[N] - Access is limited at the time of the assessment as a consequence of a natural disaster (e.g. earthquakes, hurricanes) or disease outbreak (quarantine)

X11. If there has been a natural disaster, which was it?
[Market level] (Enumeration: Observe & Ask)
[Y]/[N] - Earthquakes
[Y]/[N] - Floods
[Y]/[N] - Droughts
[Y]/[N] - Tsunami
[Y]/[N] - Storms (Tropical cyclones, hurricanes, typhoons)
[Y]/[N] - Forest fires
[Y]/[N] - Landslides
[Y]/[N] - Volcanoes
[Y]/[N] - Other (Please specify)

[22] The market [in Bor, South Sudan] was completely destroyed when the violence broke out, with almost no trading activities in the subsequent few months. The improving political stability in Bor has meant the partial resumption of market activities, and vegetables and staples are now widely available. However, as most of the shops and buildings were razed and looted, the market still contains several abandoned or under-construction sites. One third of traders have returned, though few have more than 10 mt storage capacity (WFP, 2015).

I2. How many of the following protection issues are observed in this market?
[Market level, Negative polarity] (Enumeration: Observe & Ask)
Note: the polarity is negative and needs to be inverted here, provided 'yes' alludes to protection/security issues

[Y]/[N] - There are social barriers to marginalized groups based on sociodemographic status
[Y]/[N] - Physical threats exist in the market for certain groups
[Y]/[N] - Security to reach and/or in the marketplace is an issue for everyone

X12. If there are social barriers, what are they based on?
[Market level] (Enumeration: Observe & Ask)

[Y]/[N] - Gender
[Y]/[N] - Age
[Y]/[N] - Ethnicity
[Y]/[N] - Religion
[Y]/[N] - Physical disability

X13. If there are physical threats, who are under these threats?
[Market level] (Enumeration: Observe & Ask)

[Y]/[N] - Women
[Y]/[N] - Children
[Y]/[N] - Certain ethnic group
[Y]/[N] - Certain religious group
[Y]/[N] - Physically disabled population

X14. If there are general security issues, what types of threats are present?
[Market level] (Enumeration: Observe & Ask)

[Y]/[N] - Civil unrest
[Y]/[N] - Armed conflict
[Y]/[N] - Crime
[Y]/[N] - Terrorism
[Y]/[N] - Other (Please specify)

3. MFI dimension scoring, weighting and aggregation

Scoring

The intermediate scores by dimension are generated in different ways. Once the polarity is adjusted, so that each question indicates enhanced market functionality, we apply slightly different approaches according to the market functionality dimensions.

In the case where we differentiate between cereal food, other food but cereal, and non-food items, we arbitrarily assign decreasing weights to these three groups. The rationale is that people may first secure their caloric intake, then consider a diet more nutritionally balanced, and finally try to meet their remaining essential needs. Most of the dimensions have two questions, with eight possible outcomes each:

B1. Are there products that are currently scarce in the market/shop?

C1. Are there products whose prices greatly increased in the last one month?

E1. Are there less than five traders in the market?

.1	Weight	1	2	3	4	5	6	7	8
NFIs	1	0	1	0	0	1	1	0	1
Other Food	2	0	0	1	0	1	0	1	1
Cereal	3	0	0	0	1	0	1	1	1
Weighted sum		**0**	**1**	**2**	**3**	**3**	**4**	**5**	**6**

B2. Are you/traders afraid of running out of stocks within one week from now?

C2. If we ask you/traders in this marketplace what the price will be in a week from now, would you/they normally get it right?

E2. Does one trader control the market?

.2	Weight	1	2	3	4	5	6	7	8
NFIs	1	0	1	0	0	1	1	0	1
Other Food	2	0	0	1	0	1	0	1	1
Cereal	3	0	0	0	1	0	1	1	1
Weighted sum		**0**	**1**	**2**	**3**	**3**	**4**	**5**	**6**

All the possible combinations of these outcomes are presented in the table below (left pane) as an average of the two weighted sums. Eventually, all the averages are normalized[23] in the scale of 0-10 for uniformity and easy interpretation.

[23] Normalization is achieved as follows: $norm_{dim} = \frac{av\_dim - \min(av\_dim)}{\max(av\_dim) - \min(av\_dim)} \cdot 10$, where av_dim is the average by dimension and $norm\_dim$ the normalized score between 0-10 by dimension.

AVERAGE

	0	1	2	3	4	5	6
0	0.0	0.5	1.0	1.5	2.0	2.5	3.0
1	0.5	1.0	1.5	2.0	2.5	3.0	3.5
2	1.0	1.5	2.0	2.5	3.0	3.5	4.0
3	1.5	2.0	2.5	3.0	3.5	4.0	4.5
4	2.0	2.5	3.0	3.5	4.0	4.5	5.0
5	2.5	3.0	3.5	4.0	4.5	5.0	5.5
6	3.0	3.5	4.0	4.5	5.0	5.5	6.0

NORMALIZED SCORE (0-10)

	0	1	2	3	4	5	6
0	0	0.8	1.7	2.5	3.3	4.2	5.0
1	0.8	1.7	2.5	3.3	4.2	5.0	5.8
2	1.7	2.5	3.3	4.2	5.0	5.8	6.7
3	2.5	3.3	4.2	5.0	5.8	6.7	7.5
4	3.3	4.2	5.0	5.8	6.7	7.5	8.3
5	4.2	5.0	5.8	6.7	7.5	8.3	9.2
6	5.0	5.8	6.7	7.5	8.3	9.2	10

The above approach holds for the following dimensions: **Availability**, **Prices**, and **Competition**.

In the case of **Assortment of Essential Goods** dimension, we first count the different good groups being sold (cereals, other foods, and other goods belonging to WASH, health, shelter, household items, education and communication). Theoretically, if there is a market, at least a good belonging to one of these eight groups will be supplied. In more functional markets all these groups will be available for purchase.

A1. Which products are normally sold in this shop/market?

A1								
Count of 'yes' answers	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**

Then we calculate a score for the second sub-dimension (A2), the depth of assortment, by assigning increasing weights to the four groups of stock-keeping unit sizes.

A2. What is the [maximum] number of distinct items on sale in this shop/any of the shops in this market?

A2	**Weight**	**1**	**2**	**3**	**4**
Between 1-50	1	1	0	0	0
Between 51-200	2	0	1	0	0
Between 201-1,000	3	0	0	1	0
More than 1,000	4	0	0	0	1
Weighted Sum		**1**	**2**	**3**	**4**

The dimension score is then calculated by taking the average and normalizing the average score.

AVERAGE

	1	2	3	4
1	1.0	1.5	2.0	2.5
2	1.5	2.0	2.5	3.0
3	2.0	2.5	3.0	3.5
4	2.5	3.0	3.5	4.0
5	3.0	3.5	4.0	4.5
6	3.5	4.0	4.5	5.0

NORMALIZED SCORE (0-10)

	1	2	3	4
1	0	1.0	2.0	3.0
2	1.0	2.0	3.0	4.0
3	2.0	3.0	4.0	5.0
4	3.0	4.0	5.0	6.0
5	4.0	5.0	6.0	7.0
6	5.0	6.0	7.0	8.0

7	4.0	4.5	5.0	5.5	**7**	6.0	7.0	8.0	9.0
8	4.5	5.0	5.5	6.0	**8**	7.0	8.0	9.0	10

For the **Resilience of supply chains** dimension, the first sub-dimension is scored as below:

D1.1 Considering your customers' current demand, would your current stocks last at least one week?

D1.2 If you place an order today, do you expect to receive your products within a week?

D1	Weight	1	2	3	4
D1.1	1	0	1	0	1
D1.2	1	0	0	1	1
Sum		**0**	**1**	**1**	**2**

while each of the three questions in the second sub-dimension follows the general methodology (described in the beginning):

D2.1 Are most of your suppliers geographically located in the same place?

D2.2 Do you have currently have more than one supplier?

D2.3 Is there a single supplier from whom most of your business relies upon?

D2	Weight	1	2	3	4	5	6	7	8
NFIs	1	0	1	0	0	1	1	0	1
Other Food	2	0	0	1	0	1	0	1	1
Cereal	3	0	0	0	1	0	1	1	1
Weighted sum		**0**	**1**	**2**	**3**	**3**	**4**	**5**	**6**

The three sub-scores are then averaged to produce one score for the second sub-dimension (D2), which is then averaged with the first sub- dimension score (D1):

AVERAGE

	0	1	2	3	4	5	6
0	0.0	0.5	1.0	1.5	2.0	2.5	3.0
1	0.5	1.0	1.5	2.0	2.5	3.0	3.5
2	1.0	1.5	2.0	2.5	3.0	3.5	4.0

NORMALIZED SCORE (0-10)

	0	1	2	3	4	5	6
0	0	1.3	2.5	3.8	5.0	6.3	7.5
1	1.3	2.5	3.8	5.0	6.3	7.5	8.8
2	2.5	3.8	5.0	6.3	7.5	8.8	10

In the case of the **Infrastructure** dimension, we assign the first sub-dimension score as follow:

F1. Which of the following best describes the majority of the shops in this marketplace/this shop?

F1	Weight	1	2	3	4	5	6	7
Poor state	N/A	1	1	0	1	1	0	0
Some damages	N/A	0	1	1	0	1	1	0
Good state	N/A	0	0	0	1	1	1	1

Sub-score	0	1	2	3	4	5	6

For the second sub-dimension, we count the number of affirmative answers.

F2. In/nearby this shop/market there is/are…

F2	Positive polarity								
Count of 'yes' answers	0	1	2	3	4	5	6	7	8

The scores from each sub-dimension are then averaged and normalized.

AVERAGE

	0	1	2	3	4	5	6
0	0.0	0.5	1.0	1.5	2.0	2.5	3.0
1	0.5	1.0	1.5	2.0	2.5	3.0	3.5
2	1.0	1.5	2.0	2.5	3.0	3.5	4.0
3	1.5	2.0	2.5	3.0	3.5	4.0	4.5
4	2.0	2.5	3.0	3.5	4.0	4.5	5.0
5	2.5	3.0	3.5	4.0	4.5	5.0	5.5
6	3.0	3.5	4.0	4.5	5.0	5.5	6.0
7	3.5	4.0	4.5	5.0	5.5	6.0	6.5
8	4.0	4.5	5.0	5.5	6.0	6.5	7.0

NORMALIZED SCORE (0-10)

	0	1	2	3	4	5	6
0	0	0.7	1.4	2.1	2.9	3.6	4.3
1	0.7	1.4	2.1	2.9	3.6	4.3	5.0
2	1.4	2.1	2.9	3.6	4.3	5.0	5.7
3	2.1	2.9	3.6	4.3	5.0	5.7	6.4
4	2.9	3.6	4.3	5.0	5.7	6.4	7.1
5	3.6	4.3	5.0	5.7	6.4	7.1	7.9
6	4.3	5.0	5.7	6.4	7.1	7.9	8.6
7	5.0	5.7	6.4	7.1	7.9	8.6	9.3
8	5.7	6.4	7.1	7.9	8.6	9.3	10

For **Service** dimension, equal weight is applied to each option in two sub-dimensions as below:

G1. Shopping: Which of the following applies to this shop?

G1	Weight	1	2	3	4	5	6	7	8
G1.1	1	0	1	0	0	1	1	0	1
G1.2	1	0	0	1	0	1	0	1	1
G1.3	1	0	0	0	1	0	1	1	1
Sum		**0**	**1**	**1**	**1**	**2**	**2**	**2**	**3**

G2. Check-Out: Which of the following applies to this shop?

G2	Weight	1	2	3	4	5	6	7	8
G2.1	1	0	1	0	0	1	1	0	1
G2.2	1	0	0	1	0	1	0	1	1
G2.3	1	0	0	0	1	0	1	1	1
Sum		**0**	**1**	**1**	**1**	**2**	**2**	**2**	**3**

The scores from each sub-dimension are then averaged and normalized.

AVERAGE				
	0	**1**	**2**	**3**
0	0.0	0.5	1.0	1.5
1	0.5	1.0	1.5	2.0
2	1.0	1.5	2.0	2.5
3	1.5	2.0	2.5	3.0

NORMALIZED SCORE (0-10)				
	0	**1**	**2**	**3**
0	0	1.7	3.3	5.0
1	1.7	3.3	5.0	6.7
2	3.3	5.0	6.7	8.3
3	5.0	6.7	8.3	10

In the case of **Quality** dimension, we count the number of affirmative answers, and then normalize in the scale 0-10 as described below:

H1. Is food in the shops protected from exposure to water, heat, direct sunlight, pests, chemicals, or other contaminants?

H2. Are fresh fruits and vegetables in the shops well-separated from raw meat, poultry, fish or seafood?

H3.1 Are raw meat, poultry, fish or seafood and dairy products in the shops stored and displayed in refrigerated units that are on and working?

H3.2 Is refrigeration in the shops always working? (if electricity is not stable, do stores generally have batteries/generators for continuous refrigeration)?

H4. Are all goods in labelled containers not exceeding their "best-use-before"/ "use-by" date?

H5.1 Are processed pre-packaged foods in the shops intact and in properly labelled containers?

H5.2 Is food in the shops free of visible signs of spoilage and bad smells?

H5.3 Are food packages intact and free from signs of decay or damage?

H									
Count of 'yes' answers	0	1	2	3	4	5	6	7	8
Normalized score (0-10)	0	1	3	4	5	6	8	9	10

Finally, for the **Access & Protection** dimension, the logic is similar, but the weights are applied as follows:

I1. How many of the following access issues are observed in this market?

I1	**Weight**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
I1.1	1	0	1	0	0	1	1	0	1
I1.2	2	0	0	1	0	1	0	1	1
I1.3	3	0	0	0	1	0	1	1	1
Average		**0**	**1**	**2**	**3**	**3**	**4**	**5**	**6**

I2. How many of the following protection issues are observed in this market?

I2	Weight	1	2	3	4	5	6	7	8
I2.1	1	0	1	0	0	1	1	0	1
I2.2	2	0	0	1	0	1	0	1	1
I2.3	3	0	0	0	1	0	1	1	1
Average		**0**	**1**	**2**	**3**	**3**	**4**	**5**	**6**

AVERAGE

	0	1	2	3	4	5	6
0	0.0	0.5	1.0	1.5	2.0	2.5	3.0
1	0.5	1.0	1.5	2.0	2.5	3.0	3.5
2	1.0	1.5	2.0	2.5	3.0	3.5	4.0
3	1.5	2.0	2.5	3.0	3.5	4.0	4.5
4	2.0	2.5	3.0	3.5	4.0	4.5	5.0
5	2.5	3.0	3.5	4.0	4.5	5.0	5.5
6	3.0	3.5	4.0	4.5	5.0	5.5	6.0

NORMALIZED SCORE (0-10)

	0	1	2	3	4	5	6
0	0	0.8	1.7	2.5	3.3	4.2	5.0
1	0.8	1.7	2.5	3.3	4.2	5.0	5.8
2	1.7	2.5	3.3	4.2	5.0	5.8	6.7
3	2.5	3.3	4.2	5.0	5.8	6.7	7.5
4	3.3	4.2	5.0	5.8	6.7	7.5	8.3
5	4.2	5.0	5.8	6.7	7.5	8.3	9.2
6	5.0	5.8	6.7	7.5	8.3	9.2	10.0

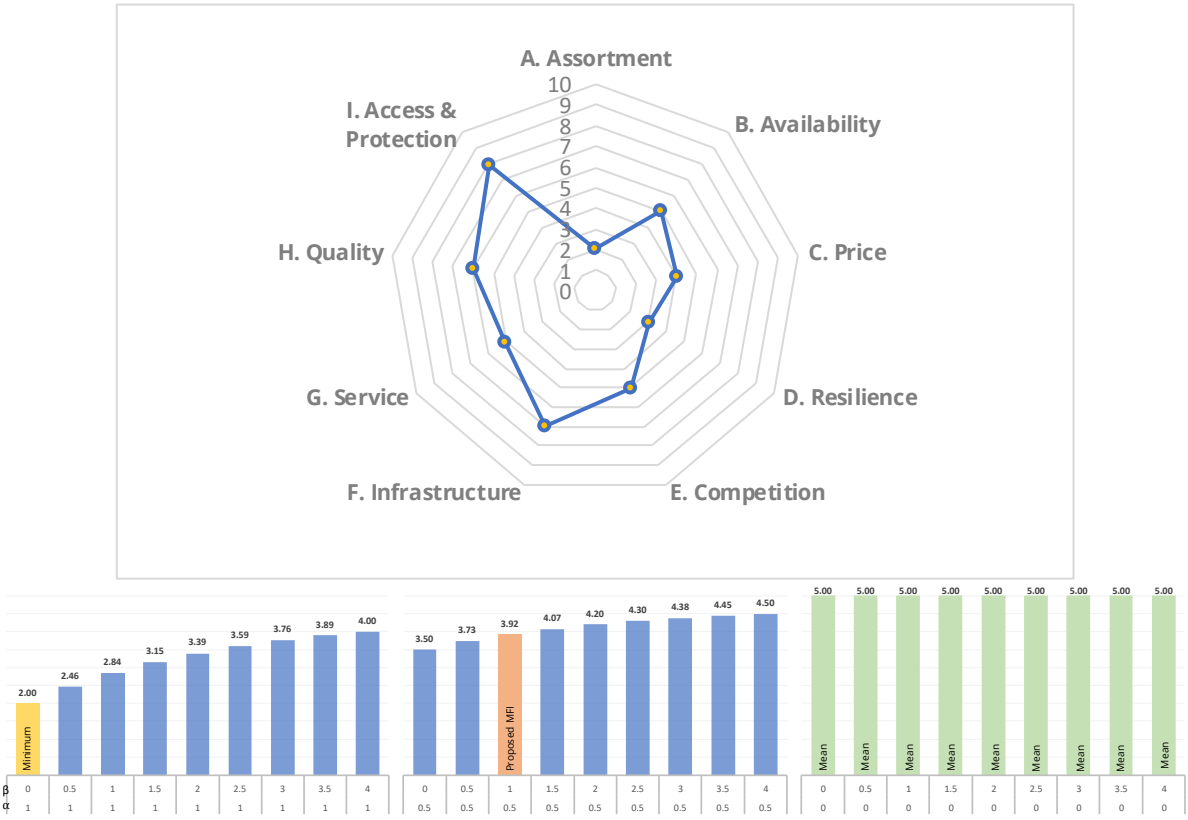
Weighting and aggregation

The MFI is a composite index, and as such there are a number of choices to get to the final score. Once we have chosen the dimensions, adjusted the polarity, and normalized all the variables, there are two additional steps left: weighting of the intermediate scores and their aggregation into the composite index. For the time being, we opt for equal weighting of the dimensions, even though it may be quite arbitrary to argue that in terms of market functionality achieving high intermediate scores in each dimension is equally binding. However, a validation study is planned once actual data from the pilot countries will allow evaluating to what extent this assumption holds. Finally, the aggregation is the final step in building a composite index. A number of techniques using compensatory or non-compensatory approaches can be applied, mostly based on how far the marketplace's functionality needs to be balanced between different dimensions. We apply the mean-min function (Casadio Tarabusi and Guarini, 2013) that can take all the intermediate values between the minimum value of one of the dimensions, thus representing the maximum penalization for unbalance between indicators, and the (weighted) arithmetic mean, which is a case of perfect compensability. For each marketplace, the aggregation function reads as follows:

$$MFI = \mu - \alpha\left(\sqrt{(\mu - min(d))^2 + \beta^2} - \beta\right)$$

where μ is the mean between the dimensions, $min(d)$ is the dimension with the minimum score, α is a penalization factor for unbalance between the nine dimensions spanning between zero and one, and β is a complementarity factor greater than zero. We set $\alpha = 0.5$ to allow for partial compensability between the dimensions, and $\beta = 1$, noticing that

the more β departs from zero, the more the aggregation function returns to the mean. The table and graph below provide an example with fictional data.



4. MFI package

The MFI comes with a full package that includes:

- ✓ Technical Guidance
- ✓ Practical Guidance
- ✓ Sampling Guidance
- ✓ Questionnaires in XLS forms both for Face-to-face and Mobile data collection, *(available in English, Spanish, French, Arabic and Portuguese)*
- ✓ Video tutorial for enumerators for Mobile data collection (*available in English and French)*
- ✓ Feedback survey for enumerators and WFP staff in the field, to collate all the feedback of this beta version
- ✓ Data Library for storing raw data, script, processed data, report, meta-data, and terms-of-reference of the market assessment
- ✓ Data Bridge for data exchange *(forthcoming)*
- ✓ Market Assessment Database *(forthcoming)*
- ✓ Dashboard *(forthcoming)*

Annex I - Infrastructure photo examples

X6. Which are the structures that better/best describe this market/shop?

Open-air/Portable unit (stand, vehicle, carriage etc.)


Semi-permanent structure (corrugated iron, wooden, rub hall etc.)



Permanent/ Concrete building structure



F1. Which of the following best describes the majority of the shops in this marketplace/this shop?

Poor state, severe maintenance issues



Some structure damages, minor maintenance issues


Good state, intact, no maintenance issues


Annex II - Food quality photo examples

H1. Is food in the shops protected from exposure to water, heat, direct sunlight, pests, chemicals, or other contaminants?

Storage of food close to chemicals, cleaning chemicals or non-food materials[24]

Food displayed for sale on floor or soil

Insect infestation on product packaging

Insect infestation in packed flour

[24] Source: https://i.pinimg.com/736x/2a/fa/ee/2afaeeb1a2fa3d667ea77bce4236bc8f.jpg

Bird droppings on product package & floor


Rodent in square bread (pain carre)

Rodent faeces/droppings in infected food, on the floor (under food) and in floor crevices




Rodent gnawing on food packs

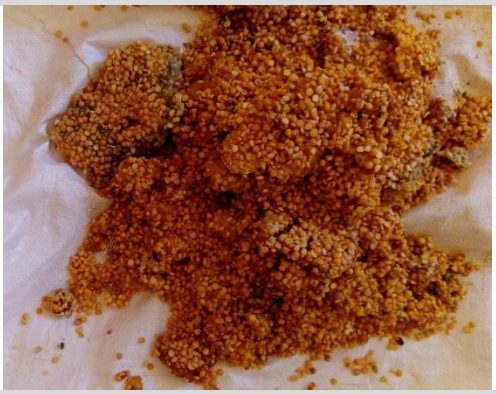


Mice footprints on dusty plastic surface


Glass contamination from unprotected/ uncovered overhead lamp


Highly toxic pest control & agricultural chemicals stored with food

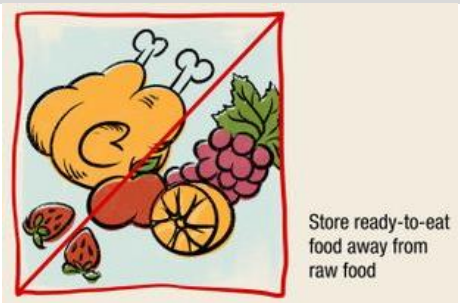

Food (flour and split peas) exposed to humidity/ water & caked/ moulded

Non- food materials can provide hiding space for pests, that infest food

H2. Are fresh fruits and vegetables in the shops well-separated from raw meat, poultry, fish or seafood?

Examples of non-separation between products



H4. Are all goods in labelled containers not exceeding their "best-use-before"/ "use-by" date?

Examples of expiry date display on package

H5.1 Are processed pre-packaged foods in the shops intact and in properly labelled containers?

Examples of non-labelled container

H5.2 Is food in the shops free of visible signs of spoilage and bad smells?

Discoloration & mould damage on grains (wheat & maize) and pulses (lentil & red beans)

Wilted leafy greens	Mouldy garlic	Mouldy onions
		

Black rot on pumpkin	Brown rot on lemon
	

Rot on tomatoes	Rot on cabbage
	

Rot on potato & signs of fungus

H5.3 Are food packages intact and free from signs of decay or damage?

Flour leakage from damaged packs


Signs of oil leakage due to sachet/ container damage




Can damages which indicate possibly unsafe food (can swelling/budging, can dents, cap dents, rust and leakages

Loose/ failing foil seal (e.g. in yoghurt)


Annex III - Photos in the questionnaire

Loyalty Program

Loyalty program is often in the form of a paper or plastic card that entitles the holder to rewards

POS System

Stock Keeping Unit

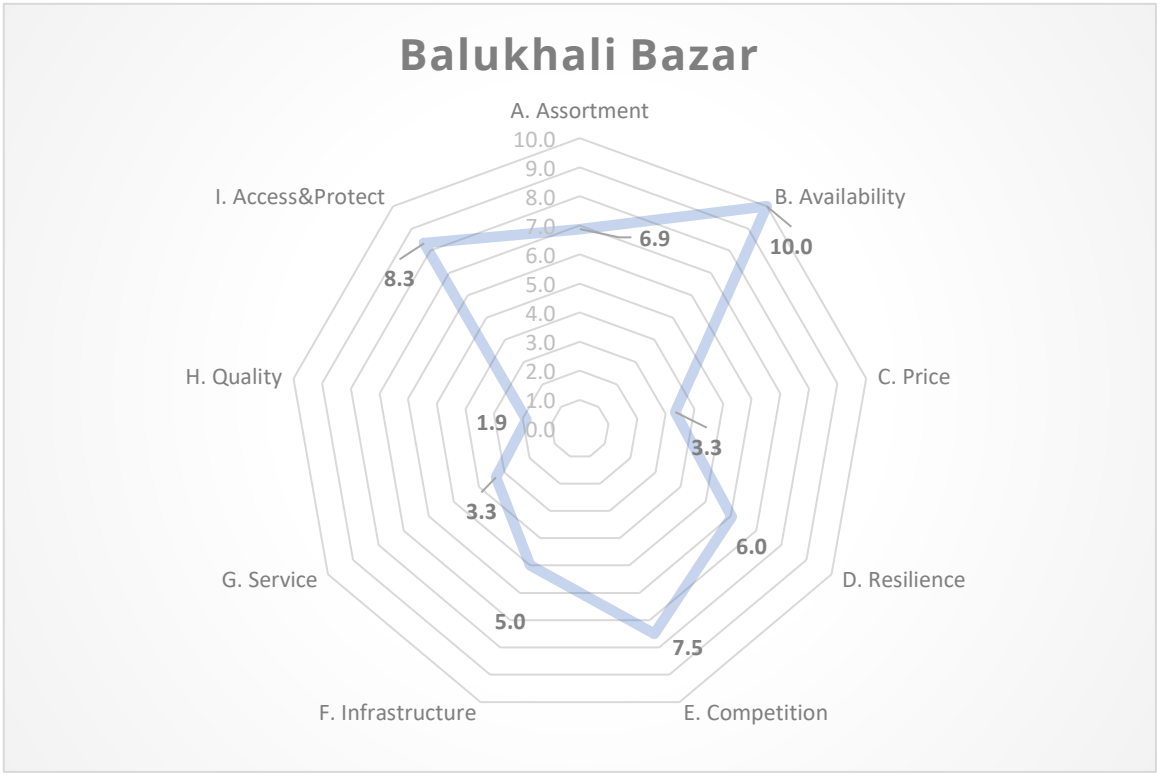
By distinct item (or stock keeping unit), we mean a distinct type of item for sale in terms of manufacturer, material, size, etc. For instance, a gas stove from the same manufacturer but in two different colours (one in GREEN, another in WHITE) would be two distinct items.

(a) Example of two (2) distinct items: Gas stove of different colors

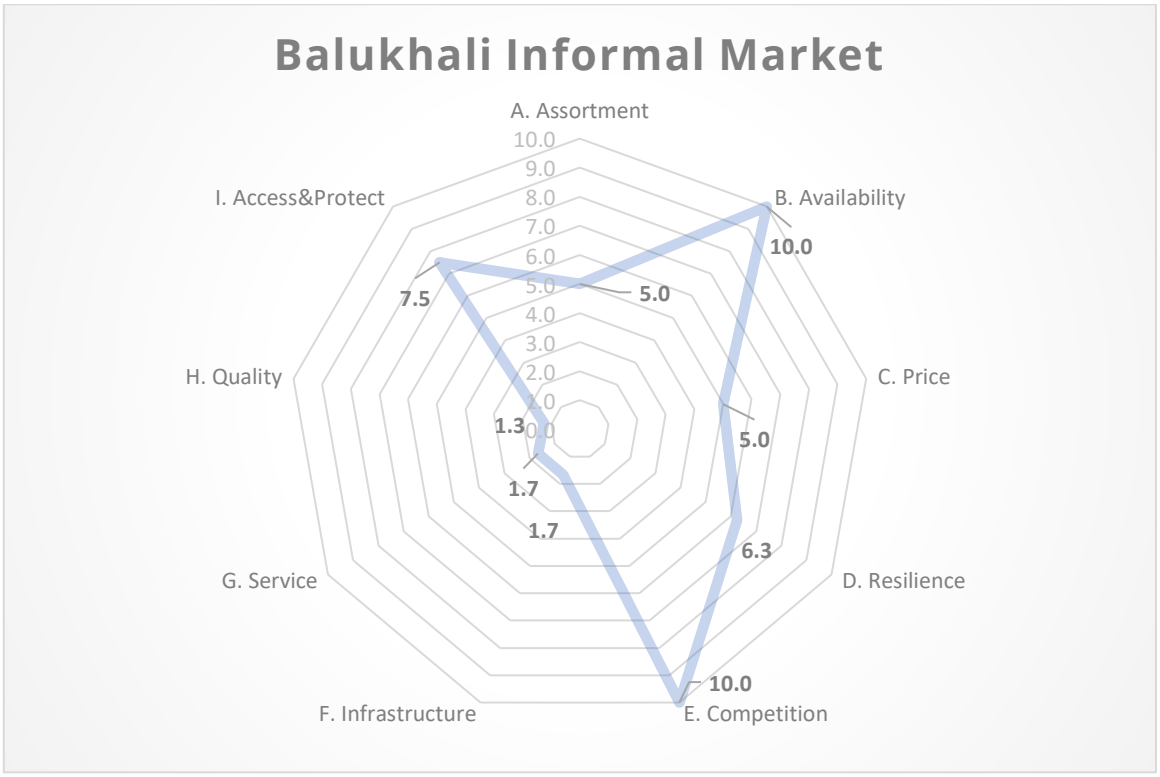
(b) Example of five (5) distinct iten Rice from different manufactu

Annex IV - MFI visualization

Examples of MFI beta Results



(Final pillar scores for Balukhali Bazar in Cox's Bazar, Bangladesh)



(Final pillar scores for Balukhali Informal Market in Cox's Bazar, Bangladesh)

References

Agrawal, S., Sengupta, R.N. & Shanker, K. 2009. Impact of information sharing and lead time on bullwhip effect and on-hand inventory. *European Journal of Operational Research*. https://doi.org/10.1016/j.ejor.2007.09.015

Aksoy, M.A. & Isik-Dikmelik, A. 2008. Are low food prices pro-poor? Net food buyers and sellers in low-income countries. *Journal of Rural Mental Health*. https://doi.org/10.1037/h0095951

Brinkman, H.-J., de Pee, S., Sanogo, I., Subran, L. & Bloem, M.W. 2010. High Food Prices and the Global Financial Crisis Have Reduced Access to Nutritious Food and Worsened Nutritional Status and Health. *The Journal of Nutrition*. https://doi.org/10.3945/jn.109.110767

Casadio Tarabusi, E. & Guarini, G. 2013. An Unbalance Adjustment Method for Development Indicators. *Social Indicators Research*, 112: 19–45. https://doi.org/10.1007/s11205-012-0070-4

Chang, W.S. & Lin, Y.T. 2019. The effect of lead-time on supply chain resilience performance. *Asia Pacific Management Review*. https://doi.org/10.1016/j.apmrv.2018.10.004

Chopra, S., Reinhardt, G. & Dada, M. 2004. The effect of lead time uncertainty on safety stocks

Craighead, C.W., Blackhurst, J., Rungtusanatham, M.J. & Handfield, R.B. 2007. The severity of supply chain disruptions: Design characteristics and mitigation capabilities. *Decision Sciences*. https://doi.org/10.1111/j.1540-5915.2007.00151.x

FAO. 2011. *Safeguarding food security in volatile global markets*. A. Prakash, ed. Rome, Food and Agriculture Organization of the United Nations. (also available at http://www.fao.org/3/i2107e/i2107e.pdf).

FAO & WHO. 1969. *Codex Alimentarius: General Principles of Food Hygiene CAC/RCP 1-1969*. 4th edition. FAO and WHO. (also available at http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B1-1969%252FCXP_001e.pdf).

Finke, G.R., Singh, M. & Schönsleben, D.P. 2012. Production lead time variability simulation - Insights from a case study. *International Journal of Industrial Engineering : Theory Applications and Practice*.

Goran, G.T. 1981. There's a S.M.A.R.T. way to write managements's goals and objectives. *Management Review*.

Harbour, J.L. 2017. *The Performance Mapping and Measurement Handbook*

Harland, C., Brenchley, R. & Walker, H. 2003. Risk in supply networks. *Journal of Purchasing and Supply Management*. https://doi.org/10.1016/S1478-4092(03)00004-9

Hart, C. & Rafiq, M. 2006. The dimensions of assortment: A proposed hierarchy of assortment decision making. *International Review of Retail, Distribution and Consumer Research*. https://doi.org/10.1080/09593960600697063

IRC. 2014. Rapid Assessment for Markets; Guidelines for an initial emergency market assessment. (also available at https://www.icrc.org/en/doc/assets/files/publications/icrc-002-4199.pdf).

Ivanic, M. & Martin, W. 2008. Implications of higher global food prices for poverty in low-income countries. *Agricultural Economics*. https://doi.org/10.1111/j.1574-0862.2008.00347.x

Kristenson, L. 1983. strategic Planning in Retailing. *European Journal of Marketing*. https://doi.org/10.1108/EUM0000000004828

Levine, S. 2017. Market in crises: the implications for humanitarian action. (also available at https://www.odi.org/sites/odi.org.uk/files/resource-documents/11722.pdf).

Oxfam. 2017. Rapid Protection, Food Security and Market Assessment, Cox's Bazar, Bangladesh. (also available at https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/oxfam_rapid_assessment_report_cb_nov_2017_.pdf).

Rhoades, S.A. 1993. The Herfindahl-Hirschman Index. *Federal Reserve Bulletin*. https://doi.org/http://www.federalreserve.gov/pubs/bulletin/default.htm

Sen, A. 1981. *Poverty and Famines: An Eassay on Entitlement and Deprivation*. New York, Oxford University Press Inc.

Song, J.S. 1994. Effect of leadtime uncertainty in a simple stochastic inventory model. *Management Science*. https://doi.org/10.1287/mnsc.40.5.603

Song, J.S., Zhang, H., Hou, Y. & Wang, M. 2010. The effect of lead time and demand uncertainties in (r, q) inventory systems. *Operations Research*. https://doi.org/10.1287/opre.1090.0711

WFP. 2009a. *Comprehensive Food Security & Vulnerability Analysis Guidelines*. 1st editio edition. F.S.A. Service, ed. Rome, World Food Programme. (also available at https://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp203208.pdf).

WFP. 2009b. How to Conduct a Trader Survey? *Analysis*.

WFP. 2011. Market Analysis Framework - Tools and Applications for Food Security Analysis and Decision-Making. Rome. (also available at https://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp243856.pdf?_ga=2.223211163.1660960930.1579703789-1703520890.1537437583).

WFP. 2015. Market Assessment in South Sudan. Rome. (also available at https://www.wfp.org/publications/south-sudan-market-assessment-february-2015).

WFP. 2016. A market performance analysis in Mozambique. rapid market assessment in Tete and Gaza provinces. Rome. (also available at https://www.wfp.org/publications/mozambique-market-performance-analysis-mozambique-september-2016).

WFP. 2017. Collecting prices for food security programming - The how and why of price data collection at WFP. Rome. (also available at https://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp291385.pdf?_ga=2.7472818.144334368.1580118079-1703520890.1537437583).

WFP. 2018a. Transfer Modality Selection Guidance note. Rome. (also available at https://newgo.wfp.org/documents/transfer-modality-selection-guidance).

WFP. 2018b. Suppl Assessment of Goods and Services for Essential Needs - interim guidance note. Rome.

WFP, Oxfam & Wahana Visi Indonesia. 2018. Market Assessment in Central Sulawesi, Indonesia. (also available at https://www.wfp.org/publications/indonesia-market-assessment-central-sulawesi-december-2018).

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