



What is known about the impact of structured demand activities on resilient food systems?

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Abbreviations

AU	African Union
APL	Above poverty line
BPL	Below poverty line
CFA	West African CFA Francs
FFE	Food for education
FFS	Food for schooling
GCNF	Global Child Nutrition Foundation
HGSF	Home-grown school feeding
LRP	Local and regional procurement
MDGs	Millennium Development Goals
NRI	Natural Resources Institute
P4P	(WFP) Purchase for Progress
PDS	Public Distribution System
POU	Percentage of undernourishment
RPDS	Revamped Public Distribution System
SF	School feeding
SMP	School Milk Programme
TPDS	Targeted Public Distribution System
USDA	United States Department of Agriculture
WFP	United Nations World Food Programme

Executive summary

Introduction

This paper presents the results of a review of the evidence for impacts of structured demand programmes on resilient food systems. Structured demand is one of several instruments – the others being strategic emergency reserves and integrated livelihoods programmes – that contribute to food security by reducing risk and vulnerability through enhancing productivity and/or ensuring a reliable supply of food. Structured demand programmes connect large, predictable sources of demand for agricultural products to small farmers, which, in theory, reduces risk and encourages improved quality, leading to improved systems, increased income, and reduced poverty.

Modalities of structured demand

The overall theory of change is that large-scale, relatively predictable programmes employing food for social good drive systemic changes needed to provide sustainable market access for smallholder farmers in developing countries, which impact upon the four dimensions of food security – availability, access, utilisation and shocks. Structured demand may impact these elements directly, that is, for its recipients, or indirectly through procurement practices and producer income effects.

Sources of structured demand include schools, hospitals, the military, planned aggregate demand (such as that in the Gulf states) and food aid programmes. This paper focuses upon the main three main kinds of structured demand programme for which there is any significant body of evidence – home-grown school feeding (HGSE), local and regional food aid procurement (LRP) – in particular, the United Nations World Food Programme's (WFP) Purchase for Progress (P4P) initiative – and Indian Public Distribution System (PDS) schemes. While the sources of demand and, therefore, uses of food differ, all forms of structured demand involve some form of LRP and, therefore, we treat indirect (supply side) impacts together.

Home-grown School Feeding

HGSE is the combination of LRP and traditional Food-for-Education (FFE) programmes. Its basic premise is that low farm productivity, poor agricultural market development, and poor educational and nutritional outcomes are mutually reinforcing, jointly determining key aspects of rural hunger and poverty.

Purchase for Progress

P4P is a complex portfolio of supply side and market interventions with the premise that not only should food transfers positively impact the food security of recipient communities (demand side) but also should improve the livelihoods (and, thereby, food security) of small-scale, poor producers (supply side) through LRP activities.

Public Distribution System

The PDS in India provides subsidised food grains and other essential commodities through a network of 'fair price shops'. Since its establishment under colonial rule, the programme has evolved from universality, through geographic targeting in tribal, arid, hill and remote areas (1992; Revamped PDS - RPDS), and subsequent economic targeting – the Targeted Public Distribution System (TPDS) – in 1997.

Availability impacts

All forms of structured demand, through their shared LRP procurement modalities, can increase food availability by causing upward shifts in local demand curves, raising farmer prices and, thus, stimulating production. Corruption and inefficiencies caused by poor design of PDS has resulted in much food being channelled through regular markets. Procurement from vulnerable, food insecure farmers may be potentially harmful to them and P4P programmes work on a precautionary principle. Poor local market analysis risks negative outcomes such as the 2001-02 Malawi food crisis. It is key to disaster recovery efforts that food markets continue to function during shocks.

Access impacts

LRP for structured demand can stabilise food prices within and between years. If made at the appropriate scale and timing it can avoid harmful market distortions, although distribution is more likely to disrupt food systems. The PDS subsidy is key in granting access to food although the targeting excludes many poor households.

Utilisation impacts

Food distributed to students and their families can improve the nutrition of school children and other members of their households. Locally procured food is preferred over internationally sourced rations,

contributing to enhanced utilisation by households. There is significant evidence that PDS increases both calorie and nutrient intakes of participating households.

Structured demand and shocks

There is very little evidence for how structured demand programmes contribute to food security in the presence of shocks. However, what little information exists demonstrates that FFE programmes can enable households to avoid coping strategies such as selling assets in order to purchase food. Evidence from LRP programmes suggests that, if well administered, they can help to prevent malnutrition and associated diseases during droughts.

Indirect impacts

Producers who are net sellers stand to gain from local increases in food prices, whereas net buyers lose out, although price effects appear to be limited to local areas and depend upon the nature and timing of purchases and distributions. All forms of structured demand present a more reliable, continuous market. Supporting interventions, such as improved access to credit and inputs and better post-harvest handling procedures, can raise productivity and incomes, and can minimize the risk magnitude of local price effects. P4P warehouse receipt systems raise incomes by smoothing supply beyond low-price gluts around harvests.

Policy implications

The evidence suggests that structured demand is most effective in promoting food security when a) coupled with supply-side agricultural development interventions, b) based upon robust, accurate market analysis (which is often lacking in food crisis contexts), and c) implemented in a sequenced precautionary approach: i) short-term; ensure immediate food security, ii) medium-term; build effective markets and infrastructure, iii) longer-term; move to market-based policies once markets are functional.

1 Introduction

1.1 Background

This paper on structured demand is one of three that examine the evidence for the effectiveness of instruments that reduce the vulnerability of the food poor by contributing to resilient food systems through enhancing agricultural productivity and/or ensuring a reliable supply of food. The common features, methodologies and concepts of these papers are described in a separate synthesis (see synthesis paper).

We begin by outlining the scope of the study and define what is meant by structured demand in its various forms, explaining the modalities by which each is intended to achieve its aims in relation to enhanced food security. We then describe the conceptual background to the paper in terms of direct and indirect impacts of structured demand type interventions, on both supply and demand sides, on food security. Following a synthesis of the evidence base for the effectiveness of each kind of intervention, we present our conclusions and the implications for agricultural development policy.

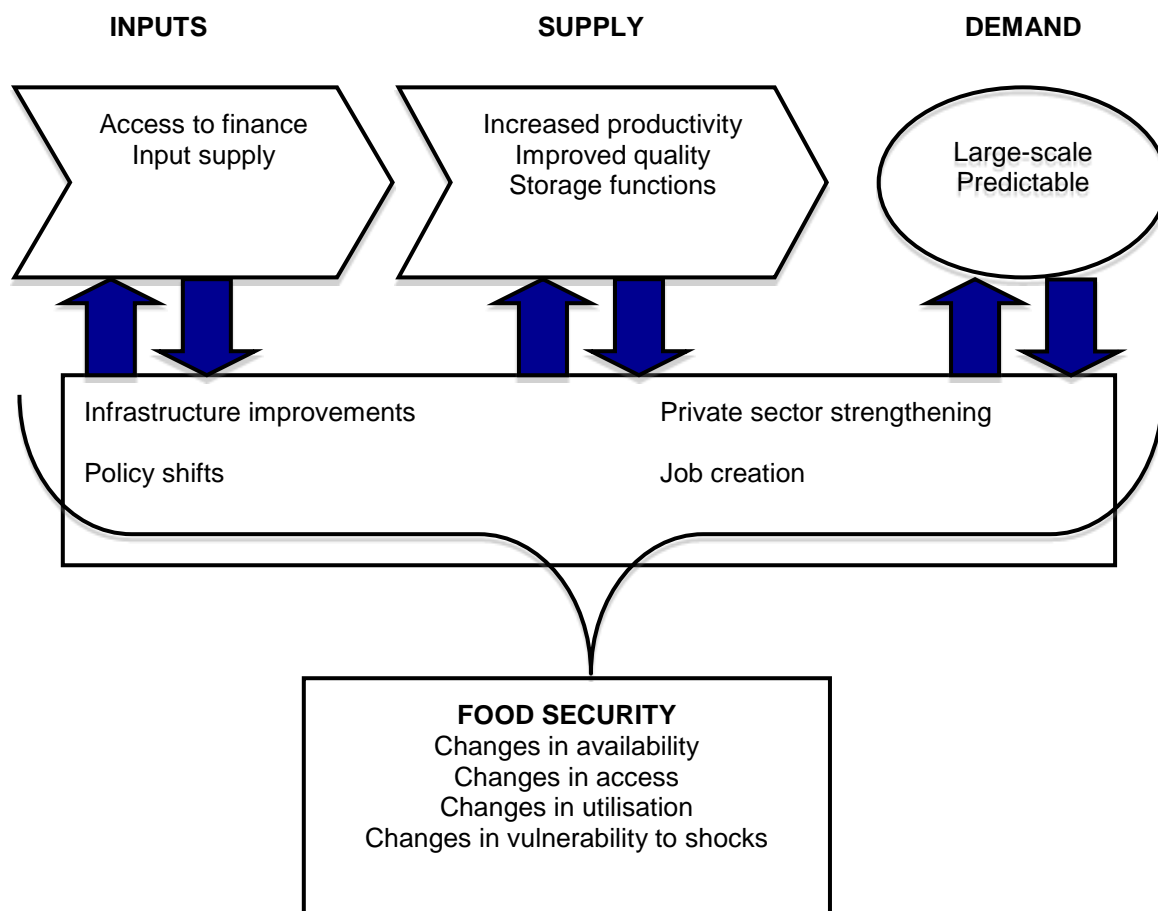
1.2 What is structured demand and how might it impact food security?

Structured demand is one of several instruments – the others being strategic emergency reserves and integrated livelihoods programmes – that contribute to resilient food systems by reducing risk and vulnerability through enhancing productivity and/or ensuring a reliable supply of food. Structured demand programmes connect large, predictable sources of demand for agricultural products to small farmers, which, in theory, reduces risk and encourages improved quality, leading to improved systems, increased income, and reduced poverty (Mitchell, 2011).

In addition, there is a sense that the food procured is used in programmes for social good. The Gates Foundation's Market Access team introduced the concept as "large-scale, relatively predictable demand for agricultural products from governments, non-governmental organizations, local and regional enterprise, and in some cases importers from other nations with new or growing food needs" (The Gates Foundation, 2010). Sumberg and Sabates-Wheeler (2010) subsequently placed emphasis on the public sector identity of the demand, defining the instrument as "a public, demand-side market intervention that seeks to reduce barriers to entry and/or transaction costs for the purpose of bringing specific groups into the market, and that may involve other longer-term, less-direct interventions (for example transportation or policy)."

Common to all conceptions of the idea is a single theory of change – that large-scale, relatively predictable programmes employing food for social good drive systemic changes needed to provide sustainable market access for smallholder farmers in developing countries, which impact upon the four dimensions of food security (figure 1), which may be defined as follows:

Figure 1: The theory of change of structured demand.



- Availability is the physical supply of food determined by production and storage levels
- Access, defined by Sen's (1983) entitlement approach, as a function of own food production, obtaining food in markets through exchange, and through transfers from governments, charities, family, friends and neighbours. Entitlements are affected by disasters, policy failures, strife, warfare, prices, employment and income.
- Utilization is the distribution of food within households among members, the preparation of food, health of those eating (in terms of how they utilise nutrients, and so on).
- Shocks may apply to the individual (idiosyncratic) or to groups (covariant) and originate from a number of sources. Some kinds of shocks, referred to as 'meso-level', fall between those two extremes and impact both groups and individuals, for example pollution, terrorism, rainfall and natural or anthropogenic disasters. The origin of shocks is diverse – natural, health-related, life-cycle related (birth, weddings, old age and death), social, economic, political and environmental (see John Farrington's paper on insurance in this series).

Structured demand, then, may impact upon food security a) *directly* by changing food availability and access for, and utilisation by, its intended recipients, and b) *indirectly* by changing the availability of, and access to, food for a wider group of consumers, including poor producers through procurement practices and income effects, for example. In addition, structured demand programmes are hypothesised to reduce vulnerability of both recipients (directly) and producers (indirectly) to shocks.

In the broadest sense of the concept, poor farmers may be connected to several kinds of large-scale, reliable sources of demand (markets). These include schools, hospitals, the military, jails and planned aggregate demand, for example that from the Gulf states (Bill and Melinda Gates Foundation, 2010). However, by far the majority of available evidence for the impact of structured demand on food security relates to three main programming categories: home-grown school feeding (HGSF), local and regional food aid procurement (LRP) – in particular, the United Nations World Food Programme's (WFP) Purchase for Progress (P4P)

initiative – and Indian Public Distribution System (PDS) schemes. Therefore, this paper focuses upon these interventions.

1.2.1. HGSF

HGSF is the combination of local agricultural production and traditional Food-for-Education (FFE) programmes. Its basic premise is that low farm productivity, poor agricultural market development, and poor educational and nutritional outcomes are mutually reinforcing and they jointly determine key aspects of rural hunger and poverty (Aberman 2007). For example, poorly nourished students have less capacity to learn and have poorer educational outcomes, which in turn perpetuates poverty. At the same time, under-supply and market failures limit food availability and access, the latter through raised prices.

Thus, HGSF is conceptualized as a means to address multiple development objectives by procuring food for FFE programmes from small-scale local food producers, thereby, in theory, sustainably improving their livelihoods in addition to the benefits to recipients. Because, as yet, it has been implemented at a large scale in only a few countries, the HGSF concept is still under development. Indeed, due to the fact that there are two basic categories of FFE intervention (table 1) – School Feeding (SF), where children are fed in school, and Food for Schooling (FFS), where families are given food if their children attend school – and many kinds of local procurement modalities, there is a wide range of interventions covered by the term.

While both programmes address short-term hunger, SF is intended to allow children to perform better and making them less likely to drop out whereas FFS addresses the consumption needs of the student's entire family. Poor families are enabled to send children to school through this income entitlement that may be used to feed other family members, or to sell the food for cash.

Table 1: Design features of FFS and SF FFE programmes

	Food for Schooling	School Feeding
Pros	Focus: reduces short-term hunger and educates children Gives food to entire needy families Transfers income to poor families: food can be sold to purchase other critical needs or family budget can be reduced Provides strong incentives to stay in school	Focus: reduces short-term hunger and educates children Increases child's learning capability in the classroom Provides incentive to send children to school Encourages children to stay in school
Cons	May not alleviate short-term hunger so that the child can learn in class	Does not benefit pre-schoolers or adults in the family Difficult to target students

Source: IFPRI (2001)

In addition, each kind of FFE approach varies further in a number of details. For example, WFP school feeding programmes include a minimum package of health and nutrition interventions, the composition of which differ among countries according to local needs and may include elements listed in table 2.

Table 2: Variations in FFE education programme composition and delivery

Factors	Modalities of FFE		
Location of food distribution	At school (SF)		
	Take home rations (FFS)		
	Both (at school and take home rations)		
Type of food delivered	Food grains (for FFS)	Regular	
		Fortified	
	Prepared food	Prepared at school	Regular
			Fortified

Factors	Modalities of FFE		
		Pre-prepared	Regular Fortified
Place of food production and procurement	Locally produced and procured		
	Not locally produced/procured	Nationally	
		Regionally	
		Donor country	
Programme implementers	National government		
	NGOs (local or national)		
	International organizations/food aid donors		
	All/some of them as a joint effort		
Complementary activities	De-worming treatment		
	Latrine installation		
	Micronutrient supplementation		
	Teacher training in health education		
	Provision of safe drinking water		
	HIV/AIDS prevention education		
	Construction of school gardens		
	Malaria prevention measures		

Source: IFPRI (2001).

LRP clearly has market-distorting potential and, therefore, its impact pathways are complex and may be conflicting, even in their effects upon the same individuals. For example, significant changes in supply or demand within a market system may potentially impact farm gate and consumer prices and, because the poor are frequently both sellers and consumers of food, they stand to gain in one way and lose in another (e.g. Aker 2008).

1.2.2. WFP P4P

As discussed above, LRP may be linked with a number of demand side interventions. One particular kind of LRP-based structured demand operations is the WFP's P4P initiative. Its stated rationale is, "to leverage WFP's procurement footprint 'to do' and 'to learn' about the potential for using structured demand to stimulate pro-smallholder agricultural and market development, with the ultimate goal of improving the livelihoods of smallholders" (WFP, 2011).

As with HGSP, the central concept of P4P is that not only should food transfers positively impact the food security of recipient communities (demand side) but also improve the livelihoods (and, thereby, food security) of small-scale, poor producers (supply side). The WFP target is for at least 500,000 low-income smallholders to produce food surpluses for sale at a fair price to improve their incomes by 2013. The development hypothesis underlying the P4P approach can be summarised as follows (WFP, 2012):

Increased Productivity + Capacity for Aggregation + Market Development + Enabling Environment =
Increased income.

P4P is a complex portfolio of supply side and market interventions and, like HGSP, employs various modalities of implementation across different countries. There are four main approach categories (table 3).

Table 3: Four approaches employed by WFP P4P programmes and their characteristics.

Approach	Characteristics/examples
Farmers' organisations and capacity building partnerships	<ul style="list-style-type: none"> • WFP buys from farmers' organisations (FOs) of varying capacities • Procurement modality and quantity selected to match FO capacity • FOs expected to progress towards competitive tendering and wider market engagement over time • FOs receive support on production and marketing • Investments in storage and warehousing equipment
Support to emerging structured trading systems	<ul style="list-style-type: none"> • WFP supports establishing warehouse receipts systems (WRS) in two ways: • Direct support for establishing WRS • Purchasing through WRS • Purchasing through cereal fairs or commodity exchanges to create a "pull-in/follow-in" effect • Working with FOs to build capacities for structured trade
Small and medium scale traders	<ul style="list-style-type: none"> • Objective to build competition in the market and provide alternative markets for farmers' surpluses • Purchasing from emerging traders/agro-dealers through modified tendering • Training traders and agro-dealers on WFP procurement and contract requirements • Investing in marketing equipment – stitching machines, weighing scales
Developing local food processing capacity	<ul style="list-style-type: none"> • Connecting farmers' organisations to established food processors • Developing local processing capacity – biscuits, supplementary feeding products

Source: WFP (2001a)

1.2.3. Indian Public Distribution System (PDS)

The PDS in India provides subsidised food grains (and other essential commodities) through a network of 'fair price shops'. The programme has evolved considerably since its inception during the 1940s under colonial rule. Until 1992, access to the PDS was theoretically universal, although in practice this was not the case. Corruption and inefficiencies made the scheme costly and its perceived ineffectiveness drove its redesign based on a principle of geographic targeting in tribal, arid, hill and remote areas in 1992 (Revamped PDS - RPDS), which became and the Targeted Public Distribution System (TPDS) in 1997.

Under the TPDS, households were classified according to their economic status as Above Poverty Line (APL) or Below Poverty Line (BPL). BPL households continued to receive subsidised food grains through the TPDS whereas subsidies for APL households have been gradually phased out (Khera, 2011). Today, the PDS policy has three main functions; first, it includes a price support system guaranteeing minimum prices to farmers for food grains sales to the state. Second, it distributes subsidised food grains (rice, wheat flour and sugar) to vulnerable households via the fair price shops, and third, it supports macro-level food supply through the maintenance of stocks (Dame and Nüsser, 2011).

2 Results

We split the available impact evidence into two parts – first, that for direct, demand side (beneficiary) effects, which are distinguished by the source of demand, and, second, that for indirect, supply side (producer) effects, which are considered to be variations on a common theme of local and regional procurement. In other words, we discuss these latter impacts together because all forms of structured demand programmes entail non-specific LRP activities. However, in each individual case we identify the nature of the programme involved.

2.1 Evidence for direct (beneficiary) food security impacts of structured demand programmes

2.1.1. HGSF programme specific direct impacts

The large number of variables and permutations within the modalities of individual HGSF programmes (section 1.2.1) means that they are not readily comparable in terms of their relative effectiveness. However, as Aberman (2007) points out, it is generally assumed that an SF programme improves the overall food intake of a participating child, while an FFS programme improves food consumption of a beneficiary household. This section presents the available evidence for the extent to which these assumptions hold.

HGSF programmes potentially represent some blurring of our distinction between direct and indirect food security impacts in that if the children of food-supplying farmers also receive meals at school – which would be the case if all children in local schools benefit, for instance – or if children receive school meals and they are assessed as coming from poor families, there is a double impact (Devereux, Sabates-Wheeler and Martínez, 2012).

Availability

Referring to FFE programmes, Aberman (2007) described the mechanism through which local purchases can help to increase demand for food crops, thus raising prices for agricultural products and thereby stimulating local agricultural production. She provided a model illustrating how output responds positively to an upward shift in the demand curve, providing that supply is not constrained by farmers' production capacities. Although this work was theoretical, we review empirical evidence for the impacts of LRP-type activities, of which FFE procurement is an example, on food systems in section 2.1.2 below.

Devereux, Sabates-Wheeler and Martínez (2010) concurred with Aberman's (2007) assertion that FFE or 'take-home rations' transfers can enhance short-term household food security of entire households by increasing the family's food availability.

Utilisation

There is a relatively large body of evidence concerning the impacts of FFE programmes on child nutrition. There is consensus that the intake of macro and micronutrients is increased, particularly when rations are fortified and supplemented by deworming (Aberman, 2007; Bundy *et al.*, 2009). These two major reviews of FFE practice and impacts are at odds, however, on whether this then positively affects nutritional outcomes. While Aberman was cautious about what she perceived as mixed evidence, Bundy *et al.* were less equivocal and cited a long list of studies demonstrating positive effects: a systematic review that showed how the provision of school meals can have a significant growth impact on school-age children (although is seemingly unable to reverse the effects of previous malnutrition) (Kristjansson *et al.*, 2007); case studies from Uganda that found both meals and take-home rations can reduce anaemia prevalence (Adelman *et al.*, 2008); randomized placebo-controlled trials in children ages 6–11 years in South Africa, which showed that fortified biscuits reduced the prevalence of malnutrition (van Stuijvenberg *et al.*, 1999); and in children ages 3–8 years in Kenya showing that iron-fortified whole maize flour improved indicators of iron status (Andang'o *et al.*, 2007).

In addition, recent randomized controlled trials of take-home rations programs in Burkina Faso demonstrated a significant increase in weight (weight-for-age and weight-for-height) of children aged 12 to 60 months (Kazianga, de Walque, and Alderman, 2009). Two further studies provided evidence that schoolchildren shared biscuits they received in school with their younger siblings at home, potentially creating a spillover effect (Ahmed, *et al.*, 2004; Lukito *et al.*, 2006).

GCNF (2009) described the interesting case of Chile, where universal school feeding aimed to eradicate malnutrition, with overwhelming success. However, as malnutrition rates fell, obesity rates between 1987 and 2000 increased from 6.5% to 17% (161%) and 7.8% to 18.6% (138%) for boys and girls, respectively (Kain, Vio and Albala, 1998). The causes were complex and linked to the growth of fast food outlets around schools rather than FFE activities.

The more recent body of affirmative evidence we have presented supersedes an earlier review, which concluded that food-based interventions have little impact on nutritional status, morbidity, or mortality levels except in crises (Clay, 2000).

Shocks

The provision of food assistance to families during times of economic stress or crisis can help them to avoid damaging 'coping strategies' such as selling productive assets to raise money for food. Devereux, Sabates-Wheeler and Martínez (2010) postulated that by comparing school attendance and child nutrition status before, during and after a livelihood shock such as a drought, or the annual 'hungry season', impacts could be quantified for HGSF programmes. Less variation in wasting over time compared to non-beneficiaries

would be expected in both primary and secondary beneficiaries of home-grown school feeding schemes. To our knowledge, this assertion has yet to be tested empirically.

2.1.2. LRP and P4P-specific direct impacts

Availability

As is the case with FFE programmes, because they share the same LRP procurement strategy, increased demand from WFP's LRP activities has created additional demand, leading to higher prices, which in turn have provided a production stimulus, leading to an increase in food supply and availability (USDA, 2009; Ferguson and Kepe, 2011).

Whether the P4P programme would generate sufficient supply to enable the WFP to meet its food aid requirements has been the subject of considerable debate. Mitchell and Leturque (2011) concluded that defaults by supplier smallholders had not significantly disrupted the pipeline to WFP's food aid beneficiaries. However, they also observed that the programme's default rate of 24% is only tolerable because P4P is a small share of WFP's local purchase total. WFP's own assessment was that the checks and balances it employs so as to mitigate risk as a public procurer slows payments to FOs relative to private sector competitors and may contribute to contract default, and that while this may not affect overall food availability, it does affect the organisation's ability to purchase its requirement for transfer to the food poor (WFP, 2011).

The unfortunate case of the 2001-02 food crisis in Malawi exemplified how important thorough and robust market analysis is in predicting potential impacts of LRP activities on the availability of food in sourcing areas (box 1).

Box 1: The importance of robust and reliable market intelligence in LRP activities – the case of Malawi

The most significant challenge to avoiding potential adverse market impacts when conducting LRP is unreliable market intelligence. While WFP and other food aid providers rely on market intelligence to understand market conditions, a number of WFP studies, NGO evaluations, and donor assessments show that some pre-purchase market analyses have been incomplete and inaccurate, contributing to unintended 'externalities' such as price hikes and reduced access to food.

A notorious example was the situation that transpired in 2007, when the government of Malawi exported 400,000 metric tonnes of maize to Zimbabwe. In the same year, WFP also procured 48,445 metric tonnes of food aid from Malawi for regional redistribution. The decisions to export to Zimbabwe and sell to WFP were based on inaccurate production estimates and a few months later, Malawi experienced higher food prices and food shortages.

As a result, WFP has significantly increased its capacity to collect and analyse local and regional market information in the last decade, but Melito (2009), citing WFP's own analyses and procurement staff accounts, stated that its market intelligence, while improved, is often inaccurate or incomplete. In many low-income countries, robust and timely data are not always available, which may limit the effectiveness of WFP's market intelligence efforts. In order to mitigate the risk of contributing to price hikes and long-term food price inflation, WFP uses import parity pricing and operates a policy of not making local procurements when local prices are higher than international prices.

Source: Melito (2009)

Access

The primary impacts of local procurement happen via price changes (Aberman, 2007). If food market prices change this clearly has implications for access by populations, either positive or negative. In addition to price levels, LRP can influence their stability (box 2).

Box 2: How LRP can contribute to price stability

Surplus-producing smallholders prioritise their own food security and are reluctant to sell all of their production. The response of farm prices to individual local tenders will chiefly depend on the level of short-term elasticity of demand, which is low for staple crops. The effect of local purchase is to increase prices, which, in the view of the low elasticities, is likely to be more than proportionate to the level of procurement. **If good timing is combined with quantities that are inversely related to the marketable surplus, local procurement will contribute to price stability. This means that local procurement should be replaced by imports during deficits.**

Farmers in areas with favourable resources will intensify production in response to the more stable and profitable price regime presented by local procurement operations and, although this may eventually lead to price collapses and generally lower price levels, local purchase can mitigate the level of inter-annual price fluctuation, albeit around a lower equilibrium level.

Source: Walker and Wandschneider (2005)

However, 'local' is a subjective term and its definition can have major implications for the impacts of a programme. For example, price impacts are likely to result from procurement in a particular locality whereas if it simply signifies domestic purchase the effects may be expected to be lesser because already productive farmers in surplus areas simply switch from export to domestic supply. Fragmentation of food markets means that effects will be heterogeneous from area to area depending on how 'local' it is and what specific regions are being procured from (Lele and Candler, 1984).

In terms of empirical evidence, a recent analysis (controlling for potentially confounding factors including inflation, climate shocks, transport costs, seasonality, parallel LRP activities by WFP, and world market prices) found that, in most cases, LRP did not affect market price levels or their volatility, with a few exceptions (Garg *et al.* (2012). The practice was associated with statistically significant price effects or price volatility effects no more frequently than one would expect to find randomly.

However, the estimated price effects were greater for distribution markets than for procurement markets. Lentz, Barrett and Gómez (2012) observed that this result is unsurprising because procurements are usually made in better-integrated markets whereas many distributions take place in more remote, isolated locations. In their analysis they concluded that when and where agencies employ careful *ex ante* response analysis to establish that LRP is an appropriate tool (in keeping with the 'do no harm' doctrine), procurements can be made without disrupting local markets.

This finding is supported by previous work – a study of local procurement in Zambia, (Haggblade and Tschirley, 2007) concluded that "it seems doubtful that WFP procurement influences domestic prices". However, Coulter, Walker and Hodges (2007) sounded a cautionary note, citing several cases in which donor procurement activity was linked to food price variation and volatility in vulnerable contexts. In conclusion, the evidence demonstrates that LRP activities (both procurement and distribution) can take place without potentially harmful food price effects if made in a timely manner and at an appropriate scale base upon careful economic analysis of market dynamics on a case-by-case basis.

Utilisation

There is a consensus that LRP/P4P interventions, with their enforcement of strict standards, have raised the quality of grain offered for local purchase and, therefore, its nutritional value (e.g. Walker and Wandschneider, 2005; WFP, 2006; Coulter, Walker and Hodges 2007). However, both Walker and Wandschneider (2005) and Coulter, Walker and Hodges (2007) observed that there had been no apparent spillover effects upon the quality of foods available within regular marketing channels. Walker and Wandschneider (2005) reported that Uganda's bimodal rainfall pattern poses difficulties for post-harvest quality management, with negative consequences for consumer health and export prospects.

Data presented by Coulter, Walker and Hodges (2007) confirmed that while a significant proportion of maize passing through regular market channels contained illegal levels of poisonous aflatoxin, that did not appear to be the case with supplies to WFP – less than 1% of 1,000 samples taken between 2003–2006 had an aflatoxin concentration exceeding 5ppb (the legal limit being 10ppb).

Another important feature that affects the utilisation of food aid is consumer preferences. The available evidence indicates that recipients significantly prefer locally procured foods to transoceanic foods. Violette *et al.* (2012) found that across all countries and categories, food aid recipients in Guatemala, Burkina Faso and Zambia were significantly more satisfied with LRP-sourced supplies than with those procured from the US. They suggested that, while these were preliminary results, their findings support the assertion that local and regional procurement is a more culturally appropriate form of food aid for individual recipients.

Shocks

Referring to the challenge of procuring food locally without damaging disruptive effects on markets even under standard conditions, USDA (2009) highlighted how this issue is exacerbated during either an initial purchase or a one-time purchase that occurs only during an emergency. In response, agencies have devised approaches whereby they make regular and more predictable purchases during non-emergencies to stimulate production and raise income while also ensuring market stability.

They highlight an example of a German Government-funded LRP-based demand side intervention to link poor Ethiopian farmers to reliable commodity markets on a profitable and sustainable basis by creating a platform of stable demand for food crops, thus raising farm incomes and stimulating a supply-side response.

The same comprehensive review of LRP system functioning in relation to covariant shocks discusses how LRP has been successful in saving the lives of vulnerable children during droughts by preventing increases in acute malnutrition. However, in all cases, the value of the food to its recipients was contingent upon its nutritional value relative to that available internationally.

2.1.3. Public Distribution System (PDS) specific direct impacts

Availability

Evidence suggests that problems with food availability are a feature of the PDS system. Although Chaudhuri (2008) estimated that enhanced allocation PDS food grains fulfilled around 50% of the average monthly cereal requirement of a BPL household, Khera (2011) asserted that much PDS food is illegally diverted to the regular market by traders in order to take advantage of higher (unsubsidised) prices. Indeed, she estimated that at the national level, 67% per cent of wheat ends up on the open market. She cites low commissions, higher-level corruption and the loss-making nature of ration shops as explanations, making corruption an economic necessity for PDS dealers.

In addition, distribution practices may be inappropriate for the needs of the poorest. Malhotra (2010) described how rice and wheat were not made available to ration card-holding families in most villages. When these commodities did arrive, a single day was fixed for distribution. This disadvantaged the income-poor (BPL) families, who lack power and time to collect money to buy items suddenly announced for sale through Fair Price outlets. The latter is an example of how availability and access issues can interact.

Access

The targeting approach to identifying poor households taken by the TPDS scheme is the subject of much debate and contestation. Swain and Kumaran (2012) argued that Government imposition of artificially low poverty figures has led to mass exclusion of the poor, a claim supported by their own reports (Mane, 2006; Gol, 2002, 2005, 2007). Khera (2011) estimated that only around one third of households have access to the PDS and contended that evidence from many states demonstrates that universal PDS is a superior means of reaching the poor and addressing food security concerns at scale. Ray (2007) demonstrated that caste-based exclusion limited access to PDS in the northern states versus southern states.

Srivastav and Dubey (2010) asserted that households buy only those products where the controlled price is below the market price through PDS, or staple and major food items within a household's required food basket. The maintenance of price differentials relies upon the level of subsidy, the withdrawal of which would result in price spikes (Ramaswami and Balakrishnan, 2002; Tarozzi, 2005). Despite the fact that a significant proportion of poor household's food requirements are purchased on the open market, it is argued that a reduction in subsidy would still be detrimental to them due to the food price effect discussed above, an effect that is hypothesised to extend to regular market channels due to dynamics that are negatively affected by inefficiencies in government food systems (Ramaswami and Balakrishnan, 2002).

Utilisation

Significant evidence indicates that the PDS increases household calorie consumption relative to open market access (although seemingly effective, a number of authors question the sustainability of the system on economic efficiency grounds but such operational issues are outside the scope of this paper). For example, Chaudhuri (2008) calculated that, at the national level, a household would, on average, have consumed about 331 fewer calories daily without access to PDS (which, again, raises question of efficiency given the expense of the programme). He concluded that urban households receive around 100 calories more than their rural counterparts. However, he argues that in order to satisfy the nutrition requirements of all the country's poor, the scheme would need to be entirely revamped or supplemented by other mechanisms.

Ray (2007) presented compelling evidence for the difference that the PDS makes to nutrition in calorific terms across Indian states. It demonstrates that a larger proportion of total calorie intake was supplied by PDS in the southern states than in the north, where access to PDS is limited according to caste, but that undernourishment was more prevalent in every state where PDS was absent, even if the difference was marginal.

Further evidence for the impacts of PDS upon the nutritional health of the poor on a nutrient-by-nutrient basis indicated that the programme significantly increased the intake of calories, proteins and iron in Rajasthan, Maharashtra and Andhra Pradesh, with positive effects on other nutrients (niacin and riboflavin) that were not significant in all cases (Gaiha, Jha and Kulkarni, 2010). However, Khera (2011) found that access to PDS significantly increased (subsidized) wheat consumption in Rajasthan at the expense of coarse cereals (such as maize and pearl millet), a finding that she found 'disturbing' because the latter are typically more nutritious than wheat. Both studies were based upon high quality primary data and, therefore, it is possible that Khera's (2011) concerns were not manifested in practice due to complicating factors additional to the simple ratio of coarse cereal to wheat consumption.

As an interesting footnote to this point, Swain and Kumaran (2012) observed that the potential to diversify PDS beyond rice and wheat (both theoretically relatively nutrient-poor fine cereals) has been entirely unexplored.

Despite the seemingly strong evidence cited above that reduction in subsidy would harm access by the poor to PDS through price spikes, data from Tarozzi (2002) suggested that in a real world case – the sudden reduction of a relatively large subsidy in Andhra Pradesh – the effect upon child nutrition was in fact quite limited. No significant effect was detected upon weigh-for-age. Among the possible explanations he offered for this somewhat counter-intuitive finding were insufficient statistical power, small effect size (estimating that a return to the original level of subsidy might have increased the calories available to children by as little as 2%), and shortness of the exposure period to the new regime (never longer than three months).

2.2 Evidence for indirect (supply-side) food security impacts of local procurement for structured demand

On the supply side, all kinds of structured demand interventions are similar in that they each employ some form of LRP. This section reviews evidence for the impacts of local procurement on producer food security.

2.2.1. Availability

In terms of how LRP systems respond to shocks, there are critical lessons regarding the targeting of procurement from potentially vulnerable producers under food stress, for example during disasters and following other shocks that precipitate food crises. A major review of local procurement for supply to those affected by food crises explains how WFP avoided the purchase of food in areas experiencing drought due to the reduced availability of foods produced in the affected areas, for example (USDA, 2009). Instead, the procurement focus was shifted to sub-regional, regional or international level.

Essentially, the organisation had secured continued access to food for those who usually purchased it by identifying and protecting the pathways that enabled them to use markets. In addition, beneficiary purchases kept food markets functioning; that food markets function in the manner they did before the emergency, and that people enjoy the same access to them, are critical prerequisites for exiting the crisis.

If food markets should collapse, it is likely that emergency food aid distribution would continue for longer with difficulty in achieving a return to pre-emergency conditions, making recovery slower. In addition, it would be harder to make the necessary longer-term changes to market conditions in order to reduce the chronic food insecurity of the economically vulnerable.

More than 25% of farmers interviewed in a case study of LRP in Uganda reported that planning of household meals had become more significant since being linked to reliable markets for their beans and maize (Ferguson and Kepe, 2011). The great majority (75%) indicated that they are able to anticipate surplus levels and measure them against home consumption rates to plan effectively for household food requirements. In this way, they had never resorted to eating food that they had originally planned to sell to the WFP. However, this is an illustration of how WFP's smallholder suppliers may potentially be vulnerable to unforeseen shocks.

2.2.2. Access (entitlement)

The extent to which producers' benefit indirectly from elevated demand and its upward pressure on food prices (and, hence, an increased entitlement) depends upon the extent to which they are net buyers or sellers (Aberman, 2007). The former benefit from higher prices through greater farm income and, therefore, receive an incentive to increase production. However, net buyers experience a decline in real income from a price increase. Evidence suggests that most families sell crops in the harvest season to satisfy immediate cash flow requirements and buy food back in at higher prices during lean periods (Barrett, 2007; Lele and Candler, 1984).

Unlike HGSF and PDS programmes, which take place over all or most of the year, traditional food aid -based interventions that operate only during emergency periods are unable to benefit farmers and traders by creating a continued demand for their products. However, with its constant large-scale demand for food for redistribution as aid transfers on a regional level, WFP's P4P is able to overcome this issue. Thus, farmers are given access to a reliable market, one of the key tenets of structured demand approaches.

A P4P mid-term review examined the extent to which the programme was succeeding in its developmental goals and, specifically, raising participating smallholders' incomes (Mitchell and Leturque, 2011). The available evidence (WFP does not record pricing data in all programme countries) suggested that farmers in Mali, Kenya and Liberia with average sales levels to WFP had increased their net annual incomes by around US\$20 per household (the programme targeted US\$50). The authors attributed the shortfall to low average farm sales, a modest price premium (10% above open market) and the costs of farmer organisations' services. Their analysis highlighted the marginal nature of the smallholding farming operations being supported (box 3).

Box 3: Income analyses in Mali, Kenya and Liberia for smallholder participants in the P4P pilot programme

Mali. A median WFP supplier of millet or sorghum in Mali supplies approximately 400 kg/household/year. The P4P premium ranges from 4–10 US cents/kg depending upon the type of organisation to which the farmer belongs. The most typical premium is that for farmers in a Union, equalling approximately US\$44/tonne. This implies, assuming no increase in output, that the farmer, who has a median output and additional input prices subsidised, gained around US\$18–22 per year. Only the 25% largest-scale of WFP's suppliers (with sales of about 900 kg millet or sorghum/year) would come close to achieving the WFP \$50 net income increase target.

Kenya. The potential premium of US\$20/tonne from P4P was negated somewhat by the costs incurred by farmers for aggregation and quality improvement. There was an estimated net income gain of US\$24/household/year.

Liberia. Some 2,883 sales of paddy rice had contributed 936 tonnes of sales since 2009. This suggests median sales of 325 kg per farmer. Interviews with farmers revealed that the price premium of P4P was US\$2.80 per 50 kg bag (the difference between the P4P price of US\$17 per bag and the market price of US\$14.20) or US\$56 premium per tonne. This implies a maximum net income gain per farmer of US\$18 per year – provided no additional funds were spent on inputs.

Source: Mitchell and Leturque (2011)

Structured demand interventions are complex and multi-faceted and the authors reported that there was some provisional evidence that productivity was being enhanced in Kenya and Mali, suggesting that in the latter case it was as a result of improved access to credit and inputs resulting from forward contracts. In addition, the leveraging of commercial credit against warehouse receipts in Uganda has allowed farmers to capitalise agricultural inputs and pay school fees directly post-harvest without resorting to output sales when the market was at its lowest.

The Natural Resources Institute (NRI) concluded that the WFP's local food procurement practices in Uganda have significantly contributed to the development of the country's maize subsector, generating employment and income in the farming and trading sectors and benefiting a wide range of other service providers (Walker and Wandschneider, 2005).

In their south-western Uganda case, Ferguson and Kepe (2011) presented further evidence that growing for WFP's local procurement programmes can result in improved income, in this case due to market-led planning and improved post-harvest handling increasing the extent to which good quality produce is delivered on time by three quarters of participating growers. In addition, there were spillover effects extending to other crops that were not purchased by WFP.

High quality evidence from an evaluation of an HGSP-linked local procurement programme in Burkina Faso demonstrated that the prices gained and revenues accrued by participating farmers increased (Upton *et al.*, 2012). Participants' incomes were raised by an average of 31,091 West African CFA Francs (CFA) (equal to roughly \$65 at the original time of writing), or 47%, relative to the preceding season compared with an average 16,668 CFA, or 25%, in the general farming population over the same period. However, Tadesse and Shively (2009) concluded that food aid shipments of three commodities representing less than 10% of domestic production had negligible effects on producer prices in three regions of Ethiopia.

The existence of a school feeding programme does not necessarily imply a 'home-grown' element at all – that is, local procurement is not mandatory. However, in practice, cost and logistical considerations mean that the majority of foods are procured within the country and, often, from nearby. Data on indirect impacts are sparse and benefits to producers and in terms of market development tend to be inferred rather than measured, although there are some exceptions (box 4).

Box 4: Indirect impacts of LRP through school feeding programmes

While the food products used in Egyptian school meals come from local farms, there is no mandatory local procurement policy or explicit objective to directly benefit local farmers. However, it is believed that 100 per cent of school feeding commodities are produced within Egypt and that there are no outside sources. For example, the School Milk Programme (SMP) is supplied by Egyptian processors and constitutes an informal milk market. A new sweet pie (consisting of sesame seeds, dates or raisins and wheat) factory in Abu Sultan was established solely for school feeding purposes, providing an assured market for the outputs of wheat and date farmers. This is one of 12 factories dedicated to school meal production in Egypt (GCNF, 2009).

A school meal in Jordan consists of a fortified biscuit and fruit. The local procurement of the fresh fruit is not mandatory and, therefore, local farmers are not directly linked to school feeding. However, oranges and apples are often sourced

from within Jordan. The Jordanian Army manufactures the fortified biscuits, and, as with Egypt, the factories have added processing capacity to the agro-economy (GCNF, 2009).

In Malaysia, where all 10,000 or so schools participate in school feeding to some degree (there are three programme variants: food supplementation, “hostel” (boarding school) and pre-school, there are once again no specific objectives linking school feeding to local agriculture and local farms are not typically located within close proximity to schools. Rather, food tends to be sourced from the temperate highland and more than 90 per cent of Malaysia’s school feeding items are produced within the country – distributors source according to the programme budget (GCNF, 2009).

Similarly, in Nigeria’s school feeding programme local market food items are frequently used in Nigeria’s school lunches and 100% of food used in in the country’s HGSFP is grown nationally. It is estimated that roughly 80 per cent of food used in school lunches is grown within 50 kilometres of schools (GCNF, 2009). This has been claimed to stimulate local food production and boost farmers’ incomes (Government of Nigeria, 2007).

In Ghana, WFP (2009) asserted that both production and income of farmers supplying schools increased. However, another source stated that, with the exception of the Eastern region, in more than 50% of the schools, less than 20% of food was purchased locally (GSFP, 2007; cited in Devereux *et al.*, 2010).

The Government of Mali (2009) claimed that food production capacity of beneficiary communities improved, increasing incomes and creating food stocks for SFPs.

In 2007, WFP, the International Food Policy and Research Institute (IFPRI) and the Gates Foundation performed a modelling exercise for a potential HGSF programme in Kenya. Although the tool was calibrated on smallholder agriculture in Kenya, the analysis was generally applicable to other sub-Saharan African states. The programme relied on purchasing from small-scale farmers in a high-potential area for maize and distributing the food to schools in a low-potential area. According to the model, the income of the small-scale farmers in the high-potential area increased by a given amount, which would be much larger if the HGSF programme were combined with agricultural interventions to raise productivity, thereby avoiding price inflation and negative impacts on net buyers of food (WFP, undated).

3 Conclusion and policy implications

Considering the large volume of literature produced on structured demand interventions over a long timescale, there is surprisingly little solid impact evidence, particularly in relation to shocks. The emphases of this paper reflect the nature of the available evidence – the bulk of the literature base deals with the Indian PDS system and the effectiveness of LRP but there are few data on indirect income effects and the information on how these systems operate in response to shocks is relatively sparse. However, what does exist is generally concordant. We summarise our findings in table 6, an impact matrix arranged according to our conceptual framework for the mechanisms by which structured demand instruments impact aspects of food security.

We remarked that local procurement for school feeding programmes is not mandatory. However, it is clear from the evidence that compulsory local purchase would be a complicated, and in some cases undesirable, issue. In terms of the effects of local procurement and distribution upon food prices, the consensus is that a precautionary approach must be adopted because impacts depend upon the scale and timing of activities.

The Kenyan case evidence underlined the importance of combining LRP activities with supply side agricultural interventions to boost productivity, thereby not only increasing farmers’ output and marketable surplus, but also further guarding against the potential local-scale reduced availability and, consequently, inflated price effects. In addition, it was a reminder that whether producers benefit or lose from small-scale price hikes depends upon whether they are net sellers or buyers of food, respectively. Therefore, a case-by-case approach must be taken using thorough and robust information.

There is a considerable gap in terms of robust evidence of the indirect impacts of structured demand on producer incomes. Incomes are affected by multiple, often extrinsic, variables and are notoriously difficult to attribute to single interventions. To collect high quality data on indirect effects, therefore, requires a concerted, deliberate effort using experimental or econometric approaches, which are expensive and may be hard to justify when monitoring and evaluation budget allocations are necessarily modest in the context of humanitarian food aid, and focussed upon food beneficiary impacts rather than those on suppliers.

In general, the impacts of structured demand programmes are heavily dependent upon the manner in which they are implemented and the quality of the evidence upon which they are based. Few examples of this have been as stark as that of the Malawian food availability crisis, to which ill-considered LRP activities

contributed. The learning from this and other events have been crystallised into best practice guidelines for market development approaches in poor rural contexts with thin local markets (box 5).

Box 5: Sequencing of market-based approaches in poor rural economies

Dorward *et al.* (2006) noted that where markets are thin in poor rural economies, market-based approaches to food security would not work – as demonstrated by Malawi's 2001-02 food crisis. In such contexts, they argue for a three-step or sequenced approach to food security and rural poverty reduction.

1. Ensuring immediate food security

- Needs policies that will work in the absence of effective markets
- Implies a dominant role for social safety nets (where the choice between cash and food transfers must be based on sound market analysis) and less focus on economic growth

2. In the medium-term there is a need to develop effective markets and rural infrastructure

- While maintaining social protection measures that are sensitive to local market conditions

3. In the longer term, once markets and traders are well established and rural infrastructure is in place, then market-based policies can be increasingly relied upon to promote food security and rural economic growth.

In short, policies must be selected that complement each other in achieving short- and long-term objectives, and should be revised over time as situations evolve. Sometimes instruments will need to be largely non-market based, but at other times the appropriate instruments will be predominantly market based. This means positioning structural demand activities with their transformational objectives for agriculture within a broader, long-term development strategy in which policies and interventions relating to input and output markets, infrastructure development and agricultural research, are synergised and rationally sequenced.

Source: Dorward *et al.* (2006)

Table 6. Impact matrix – evidence for direct and indirect impacts of structured demand programmes on four aspects of food security (resilient food systems). Text in parentheses identifies which kind of structured demand programme the evidence was sourced from.

	Availability	Access	Utilisation	Shocks
Direct	<p>Causes upward shift of demand curve, raising farmer prices and stimulating production (all).</p> <p>Corruption, inefficiency and poor design limits availability through food being sold into regular market channels (PDS).</p>	<p>Can stabilise intra- and inter-annual food prices (albeit often at an initially elevated level).</p> <p>Distribution more likely to disrupt markets than procurement.</p> <p>Appropriate scale & timing can avoid harm (LRP/P4P)*.</p> <p>Subsidy enables access for many but targeting excludes many BPL households (PDS).</p>	<p>Improved child nutrition & spillovers to other household members (FFE).</p> <p>Improved quality of WFP crops but no spillover to others.</p> <p>Quality improvements though higher LRP/P4P standards.</p> <p>Locally procured food preferred over imported. (LRP/P4P)*.</p> <p>Increased calorie and nutrient intake result in improved nutrition (PDS).</p>	<p>Households can avoid coping strategies of selling assets to buy food (FFE).</p> <p>Can prevent malnutrition and disease during drought, depending upon nutritional value (LRP/P4P)*.</p>
Indirect	<p>Careful targeting can avoid harm to vulnerable (food insecure) producers (LRP/P4P)*.</p>	<p>Net sellers benefit from increased demand through higher farmer prices; net buyers lose out.</p> <p>Reliable market, continuous demand, better handling & improved access to credit & inputs raise productivity and incomes (LRP/P4P)*.</p> <p>Warehouse receipt systems smooth supply, increasing income (P4P).</p>		

*LRP is a feature of every form of structured demand

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