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How critical is transport and logistics infrastructure to interregional trade? The case of high-value fruits and vegetables in Mindanao

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Mindanao has long been considered as the food basket of the Philippines. Favorable climate, the availability of fertile land, and diligent production effort contribute to the bountiful harvests for local consumption and for exports (Table 1).

Latest data from the National Statistics Office show that 1.45 million tons of agricultural products and live animals were produced in Luzon in 2009; about half of these were retained in Luzon for consumption or processing, while about 36 percent went to Visayas and the rest were shipped to Mindanao. Visayas retained around 80 percent of its agriculture and livestock production while about 13 percent were shipped to Luzon. Mindanao received a smaller share of the total production of food and live animals of Visayas. Mindanao is the largest producer of food and live animals but it only retained about 7 percent of its produce for local consumption as 90 percent went to Luzon and Visayas where the major urban markets are located.

Recent interviews with small farmers (growers), traders, transporters (truckers and shippers), and wholesalers-retailers in Mindanao indicate that they have a common

PIDS Policy Notes are observations/analyses written by PIDS researchers on certain policy issues. The treatise is holistic in approach and aims to provide useful inputs for decisionmaking.

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Table 1. Food and live animals interisland commodity flow pattern (2009)

Origin	Destination (million tons)			Total
	Luzon	Visayas	Mindanao	
Luzon	0.71	0.52	0.22	1.45
Visayas	0.08	0.47	0.07	0.63
Mindanao	0.75	0.68	0.11	1.54
Total	1.54	1.67	0.40	3.62

Source: National Statistics Office

Table 2. Regression results of the gravity model for total agriculture trade, vegetables, and fruits

Explanatory Variables	Total Agricultural Trade	Total Vegetables[a]	Total Fruits[b]
GDP-reporting region	2.12***	0.67ns	-1.22**
GDP-destination region	3.00***	2.09***	3.26***
Population of destination region	-4.36***	-5.58***	-7.16***
Distance	-0.61**	-0.40***	-0.41***
Paved road of reporting region	0.35ns	1.81***	2.67**
Paved road of destination region	0.41ns	0.35ns	0.72ns
Markets-destination region	9.84***	8.40***	8.73***
No. of vessels in port of origin	0.44***	0.25***	0.33***
Constant	-24.38***	0.54ns	15.00***

[a] include PSCC codes *054* (vegetables, fresh, chilled, frozen, or simply preserved (including dried leguminous vegetables); roots, tubers, and other edible vegetable products, n.e.s., fresh or dried) and *056* (vegetables, roots and tubers, prepared or preserved, n.e.s.)
[b] include PSCC code *057* (fruit and nuts [not including oil nuts], fresh or dried)
Note: *** and ** indicate level of significance at 1 percent and 5 percent probability level, respectively, while "ns" indicates nonsignificance.

issue with the high cost of transporting agricultural products from the region to demand centers in Metro Manila and Visayas. They lament the inefficient road and port network that constrain the transport of produce from key production areas to intermediate and terminal markets with adverse consequences on both consumer prices and profits of players in the supply chain.

This *Policy Notes* reports findings from a recent research study on transport and logistics costs in Mindanao and recommendations to address the situation. A field survey of papaya, lettuce and tomato producers, traders, truckers, wholesalers-retailers, and interviews with key informants in the ports and shipping sector done in 2011 provided the primary data for the study and this article.

How critical is transport and logistics infrastructure to interregional trade?

Lantican (2010) reported that logistics costs, including transportation costs, account for as much as one-third of the total cost of producing high-value vegetables. The inefficiency in the road networks and port and shipping services leads to losses during transport of the produce, adversely affecting the profitability of key players in the supply chain. Delos Reyes et al. (2011) reported that the inadequate volume of roll-on-roll-off (RORO) ship hauls and the inappropriate design of RORO ships for transport of agricultural products have led to cost inefficiencies and large postharvest losses, respectively. It is estimated that around 20–50 percent of fresh produce can be lost as it moves along the supply chain from the farm to the end consumers (Lantican et al. 2011). This echoes the findings of a NEDA-UNDP study (2005) that transport and logistics have a huge impact on the cost structure of farmers in Cagayan de Oro who sell their goods directly to the final market in Manila via shipping.

The empirical results gathered by Llanto et al. (2012) corroborated these findings (Table 2). An estimation of an interregional gravity model revealed that gross regional domestic product, level of market development, transport infrastructure, particularly road network and ports, and geographical proximity are important determinants of interregional agricultural trade in the Philippines.[1]

The results validate and explain the interregional trade flow of agricultural commodities that takes place across Luzon, Visayas, and Mindanao. Mindanao has been a major source of food for consumption and for processing into agri-based products in Luzon and Visayas. In particular, the efficiency of interregional agriculture trade flows is significantly determined by the presence of infrastructure, particularly a good road and port network.

How do bad roads and inefficient port and shipping facilities affect supply chain players?

Small farmers/growers

- Based on the survey, availability of markets is not a problem but accessing these markets to dispose of their crops is a challenge to growers. Small growers/farmers complained about the problem of accessing the markets[2] due to poor road condition and the lack of transport equipment. Roads in the survey areas are primarily earth or gravel type and only the major highways are either asphalted or built as concrete roads. The survey found that road quality determines transport cost and accessibility of markets. Bad roads increase the cost of transporting produce, the risks of spoilage and deterioration of the quality of the produce, and the risk of road accidents.

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Table 3. Passability of roads going to the municipal markets and its associated costs by commodity

Commodity	Total Number of Grower Respondent	Average Cost to Go to the Market Round Trip (PHP)	Growers Who Said that Farm-to-market Road Is Passable (%)
Lettuce	38	53	100
Papaya	43	67	97
Tomato	60	149	77

- Data showed that the more passable/better the quality of the road network is (as perceived by the growers), the lower is the transport cost associated with it (Table 3).

- The alternative method of disposing of produce is to sell to traders or brokers who buy at the farm gate but at lower prices. This seems to be a common practice among

[1] For details on the mode and data used, the regression model, and the numerical results of the estimation, please see Llanto et al. (2012).
[2] Markets in the cities of Cagayan de Oro and General Santos from where farm produce are transported to Metro Manila and the cities of Cebu and Bacolod in the Visayas.

Clustering of farmers to consolidate individual produce into a larger volume to warrant sale outside the farms is a good strategy to justify transport to urban markets but this will entail strong coordination and cooperative behavior among small growers.

small growers because of the convenience this method gives them, and the difficulty of transporting produce to local markets.

- Traders assure small growers of a market. Growers would not have to undergo the hassle of transporting their produce but this comes at a cost to them in terms of the price differential between trader's buying price at the farm gate and the higher price in the local markets. However, small growers need a quick turnaround of their investments in production and, thus, they settle for the lower prices offered by traders.

- Growers have a relatively lower level of education and technical training than traders. Better education and access to technical training will help them to strike better deals with traders.

- The volume of production in various small farms appears to be relatively small, which does not justify investing in transport equipment to bring the produce to the markets. Clustering of farmers to consolidate individual produce into a larger volume to warrant sale outside the farms is a good strategy to justify transport to urban markets but this will entail strong coordination and cooperative behavior among small growers. At present, small growers individually engage with the traders in the disposal of their farm produce.

Traders

- Traders reported that in addition to cost of acquisition of farm produce, which often comprises the bulk of trading cost, transportation cost makes up a significant portion of their expenses. The estimated transportation cost is 9–12 percent of trading costs for tomato and lettuce traders while it is 25–28 percent for papaya traders. Papaya traders' trading cost ranges from PHP 5,000 to PHP 24,015 per transaction. The trading cost of tomato and lettuce traders is PHP 11,400 to as much as PHP 45,000 per transaction.

- All papaya traders reported that most of the farm-to-market roads are of the earth type (lowest quality type) and they incur transport expenses of more than PHP 500 per round-trip on this type of road. In contrast, two papaya traders pointed out that transport cost over concrete roads is much lower at PHP 300 per round-trip to get to their sources of papaya. On the other hand, most lettuce and tomato traders reported that 83 percent of farm-to-market roads in the survey areas are of the gravel and earth types, which contribute to high transport costs.

- Transportation issues are a major concern of traders. These include: (1) the high cost of transport rental, especially for

papaya traders; (2) the absence of good quality road network from the source to the market, and in some areas, there are farm roads not connected to the main roads; and (3) the high cost of fuel and related costs.

Truckers and shippers

- Truckers complained that poorly constructed farm-to-market roads increase the incidence of truck breakdowns, lead to high maintenance costs, and increase road accidents.

- Informal payments ('bribes') and inconsistent application of rules (the case of permits honored in one barangay but not recognized in another) are hard realities in the survey areas. They reported being forced to pay bribes to local officials for passage through local roads, which increase the costs of transport of produce from production areas to the urban markets, and are recovered by truckers by charging wholesalers/distributors higher fees.

Wholesalers-retailers

- Spoilage is one of the most important factors affecting the profitability of wholesalers and wholesaler-retailers. On the average, about 11–12 percent of the total volume of tomato and lettuce transported and marketed are lost due to spoilage/ wastage. For papaya, about 15 percent are spoiled or wasted. This was attributed to poor handling, wrong loading practices at the farm level, poor storage facilities, and delays in transport of perishable agricultural products because of poor road conditions.

Ports and shipping

- The survey team observed that the transport and shipping infrastructure for pineapples and bananas are more efficient, standardized, and predictable than those for other agricultural commodities. It is efficient because it is linked to international and local shipping schedules, which impose certain performance standards and

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Photo by Delia Romero

discipline; otherwise, local shippers lose out to their competitors in a highly competitive market for high-value fruits in the international markets. It is predictable because of the observance of regular transport and shipping schedules, the assurance of space for those commodities in international and domestic container ships, and information on fees, charges, and other shipping costs. In contrast, small papaya, lettuce, and tomato growers and traders do not enjoy the same efficient transport infrastructure that pineapples and bananas have.

- Access to shipping facilities does not seem to be a problem because several domestic shipping lines serve major shipping routes from Mindanao to Metro Manila and the urban centers of the Visayas. Shippers of farm produce have to book their trans-shipment to Manila and other urban markets on time and pay the corresponding fees. There is a variety of cargo transported by domestic ships and there is no guarantee that farm produce can be accommodated anytime without observing timely booking and payment of fees.

- Commercial crops such as bananas and pineapples are usually shipped as 'full container load' (FCL). Truckers/shippers load the containers in the plantation sites of bananas and pineapples and bring them to the port ready for loading to container ships. Local shippers of papaya, lettuce, and tomatoes in Mindanao find difficulty in having a consolidated volume that is sufficient for FCL shipping and, thus, most of them ship their farm produce under "less-than-container" load (LCL). A shipper who goes for LCL has to share space in the container with other shippers who may be transporting different kinds of goods. It is more costly to ship under LCL than FCL.

- Shippers or traders either buy from the farm site or from the AGORA bagsakan (wholesale) market in Cagayan de Oro, and bring the produce to the container yard owned by the shipping line for consolidation. The staffing and stripping[3] are done in the container yards. The problem with LCL is that it is more tedious to undertake because there is a need for an area where the shipper assembles or aggregate different types of commodities before loading them as LCL. The consolidation can be done in a container yard but there is the associated cost of paying workers' wages and fees for the use of the container yard. Unloading farm produce in the container yards and loading the produce in containers after sorting and consolidating, which are then loaded to the container ships as LCL cargo, constitute a costly and time-consuming process. Because of these factors, domestic shipping costs for papaya, lettuce, and tomatoes tend to be much higher than shipping costs for export crops such as pineapples and bananas.

- An alternative for small producers who want to ship their farm commodities directly

Table 4. Comparative cost of conventional shipping and RORO shipping

Type of Commodity	Traditional Shipping (in pesos)	RORO Shipping (in pesos)*	Savings (%)	Origin–Destination
1. Beer*	30,400	13,000	57	Batangas–Calapan
2. Dry goods*	50,000	40,000	20	Manila–Cebu
3. Medical kits**	10,000	4,000	60	Iloilo–Bacolod or Dumaguete
4. Live cattle***	90,465	51,500	43	Guihulngan, Negros–Manila
5. Liquid CO2	225,000	71,664	68	Bacolod–Cagayan de Oro
6. Assorted fish	32,000	23,360	27	Zamboanga City–Bato, Cebu

* truck load
** 80 boxes
*** 80 heads of cattle
CO = carbon dioxide (truck load= 95.5 cubic meter).
Assorted fish = truck load of 144 boxes
Note: Inclusive of return trip.
Source: ADB (2009) *Bridges Across Oceans*

to wholesalers or wholesalers-retailers in Metro Manila and the urban centers of the Visayas is to use RORO ships. In Cagayan de Oro, a private port operator allows RORO ships to transport lettuce and tomatoes to urban centers outside Mindanao. RORO ships seem more appropriate for small farm producers who want to reach urban markets outside Mindanao. RORO shipping is more affordable and convenient to local producers, traders, truckers, or shippers (Table 4). However, small farmers or growers who do not have transport equipment and are not properly organized will not be able to take advantage of RORO shipping.

What can policymakers do?

This *Policy Notes* presents a case for improving the road, transport, and shipping network in Mindanao in order to improve the supply chain of high-value fruits and vegetables from that island group to major consuming areas in Luzon and the Visayas. Better and more reliable road and transport infrastructure will help to expand production, increase value-added of those commodities, generate employment, and contribute to poverty reduction in Mindanao. The inadequacy of critical infrastructure such as roads, ports, and shipping facilities hampers the efficient movement of people and the transport of goods and various commodities.

In light of the findings of the empirical study, the following are recommended:

- Government has to invest in road and port infrastructure that will connect producing areas to markets that can absorb the farm produce.

- Government has to improve RORO services for greater connectivity of markets and mobility of people. Improving RORO

services will require the adherence of shipping companies to the prescribed safety and soundness standards of the shipping industry.

- Government can also help small producers to get the best possible price for their produce by providing timely and accurate market information through various means of communication. Small producers face problems not only of access to transportation facilities but also of organization and market information.

- There is scope for government coordination of nonprice factors such as organization of small producers, strengthening regulatory institutions, and improving regulations for more efficient markets.

- Government should also ensure that regulation affecting the supply chain, e.g., system of permits and licensing, safety and soundness standards for road and sea transport be properly implemented.

- Government should rationalize its road investment program and improve road construction and maintenance. Local governments are typically in charge of local roads, including farm-to-market roads, but these are not properly constructed and maintained. They should be made more accountable for those local roads.

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