
MEMORANDUM

1100 1st Street, NE, 12th Floor
Washington, DC 20002-4221
Telephone (202) 484-9220
Fax (202) 863-1763
www.mathematica-mpr.com

TO: Cindy Sobieski, Jack Molyneaux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
SUBJECT: Evaluation design for Ghana Ferry Activity

DATE: 6/14/2019

1. Introduction and Background

A. Country context

While Ghana has experienced rapid economic growth (around 7 percent per year on average since 2005), there remains a stark inequality between rural and urban areas. Households in rural areas are nearly four times as likely to live in poverty as households in urban areas, and poverty rates are highest in the remote northern regions, and among agricultural workers (Cooke, Hague and McKay 2016). Rural farming populations face significant transportation costs to get their goods to market, which geographically isolates them from the economic growth in urban areas. For example, nearly 60 percent of Ghana's rural population lives two hours away from a market center, and about 10 percent live at least five hours (or more) away. Reductions in travel times and transportation costs could improve incomes for rural populations by promoting cash crop production and reducing reliance on subsistence farming (Caselli and Gollin 2012).

To address these constraints to economic growth, the first Ghana compact with the Millennium Challenge Corporation (MCC) aimed to reduce poverty through economic growth led by the agriculture sector. Signed in 2006, the Ghana I compact investments started in February 2007 and ended in February 2012. The compact funded three projects designed to increase agricultural production and productivity and enhance the competitiveness of high-value cash and food crops. A significant portion of the Compact focused on improving transportation networks serving rural areas through the Agriculture and Transportation Projects. In addition to funding road upgrading, the compact also improved a key ferry crossing on Lake Volta (Ferry Activity) under the Transportation Project, by purchasing two new ferries and funding improvements to the landings and terminals.

B. Objectives of the report

This memo provides background on the Ferry Activity and proposes a strategy for evaluating the role that the two ferries have had in improving the movement of people and goods as envisioned in the compact's program logic. In the remainder of this memo we provide an

MEMO TO: Cindy Sobieski, Jack Molyneux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
DATE: 5/13/2019
PAGE: 2

overview of the compact and the Ferry Activity, and present the evaluation questions, data and proposed evaluation design specific to it. Where relevant, we refer readers to the Evaluation Design Report (EDR) for the Ghana Roads Activities (Rangarajan et al. 2018).

2. Overview of the compact and interventions evaluated

A. Overview of the project and implementation plan

The Ferry Activity was funded under the Transportation Project, with the aim of facilitating growth of the agricultural sector of the Afram Basin Zone. The improvements were designed to increase transit capacity and reduce wait times at the Adowso - Ekye Amanfrom crossing – a crossing which links the Afram Plains to road routes to Southern Ghana and Accra. This crossing is operated by the Volta Lake Transport Company (VLTC), which operates ferry services across Lake Volta. The Ferry Activity funded:

- Construction of two double-ended ferries (for faster loading times), *Freedom and Justice* and *Millennium Challenge*
- Rehabilitation of the landings and terminal facilities and removal of tree stumps in the navigation path
- Rehabilitation of a floating dock at Akosombo to support VLTC's maintenance capacity.

The Ferry Activity targeted 5,400 beneficiaries located in the Afram Plains. (MiDA 2011) For more detail on the Transportation Project and a discussion of the complementary investments funded by other compact Projects, refer to section I.B in the Ghana Roads EDR.

The Ferry Activity was implemented as originally designed, except for delays in completing the work. At the close of the compact, 89% of the contact sum was disbursed. The remaining work on the ferries and the landing docks was expected to be completed in May 2012, four months after the end of the compact with funds from the Government of Ghana (MiDA 2012). During our evaluation design trip, we learned that the *Millennium Challenge* remains at the Adowso - Ekye Amanfrom crossing, but the VLTC moved *Freedom and Justice* to Kete-Krachi after the end of the compact to replace the existing ferry which was no longer functioning (Welsh et al., 2017).

B. Theory of Change

The immediate outcomes targeted by the Ferry Activity were increased transit capacity and reduced wait times for freight traffic at the Adowso – Ekye Amanfrom crossing, by increasing the number of crossings, acquiring new ferries that could load and unload more quickly and making improvements to the terminals and crossings. These outputs aimed to support the overall Transportation Project objective of reducing transportation costs for agricultural commerce. The Ferry Activity also shares the same program logic with the Trunk Road Activity in that both were designed to improve access to the Afram Basin (MiDA 2011). For a further discussion of

MEMO TO: Cindy Sobieski, Jack Molyneaux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
DATE: 5/13/2019
PAGE: 3

how reductions in transportation costs lead to the compact goal of reducing poverty through economic growth led by agricultural transformation, refer to section I.B of the EDR.

C. Cost Benefit Analysis & Beneficiary Analysis

MCC has not published an ERR analysis for the Ferry Activity to date. The latest version of the M&E Plan reports an ERR of 15%, but there is no supporting documentation explaining how the ERR was determined. (MiDA 2011 and Jacobs 2006)

D. Literature Review

For a discussion of the literature related to the Transport Project, refer to section I.C in the Ghana Roads EDR.

3. Evaluation design

A. Evaluation questions

MCC has asked Mathematica to assess the feasibility of addressing two research questions using available administrative data:

RQ1: What is the composition and quantity of traffic on each ferry at its current location?

RQ2: What goods are being transported on the ferries, particularly in the direction away from the Afram Basin?

RQ1 addresses a key outcome of program logic that is crucial for establishing a link between reducing transportation costs and the compact objective of reducing poverty through economic growth – without a change in traffic volume, we should not expect to see a reduction in poverty that is attributable to the Ferry Activity. RQ1 includes an analysis of both ferries, even though one is no longer operating at its intended location. After investigating available administrative data, we can potentially address RQ1 using available records on traffic volumes and vehicle composition.

RQ2 aims to identify whether increased market access, through reduced transportation costs has affected the agricultural sector in the Afram Basin targeted by this activity. However, we will not be able to address RQ2 as we have not been able to identify any available records on the type of goods being transported.

B. Evaluation design overview

We propose to address RQ1 through an analysis of existing administrative data on ferry traffic. We can do this using post-compact data from VLTC records for both ferry crossings and pre-compact data for the Adowso - Ekye Amanfrom crossing from MCC project documents (Jacobs, 2006). In particular, we can compare the change in traffic volume for the *Millennium Challenge* ferry before and after the ferry was installed. However, since the *Freedom and Justice*

MEMO TO: Cindy Sobieski, Jack Molyneaux
 FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
 DATE: 5/13/2019
 PAGE: 4

ferry was moved to Kete-Krachi, no pre-compact information is available. As a result, an assessment of this ferry would be based only on traffic volume after the ferry was installed. Table 3.B.1 outlines the key outcomes, data sources and data types that would be used in the evaluation.

Table 3.B.1. Evaluation questions and data sources

Evaluation question	Key outcome	Data source	Data type
RQ1	<ul style="list-style-type: none"> Traffic volume Traffic composition 	VLTC Compact documents	Administrative

C. Quantitative approach

Methods

We propose a quantitative approach to address RQ1 that involves a traffic analysis comparing pre-project traffic to post- project traffic for the Adowso – Ekye Amanfrom crossing since the ferries were completed. It would also include a trend analysis to identify whether and how traffic volumes have changed since the completion of the compact, and a descriptive analysis of vehicle composition for both crossings.

Timeframe

Annual data is available for the six year period since the ferries were completed in 2012. We have data on the total number of vehicles for the Adowso – Ekye Amanfrom crossing from 2006 to 2012. However there is no vehicle data available for the Kete – Krachi crossing prior to the arrival of Freedom and Justice because this crossing was served by an aluminum boat that could not carry vehicles. If there is an effect of the Ferry Activity on traffic volume, we should be able to observe a change in traffic volume for the Adowso – Ekye Amanfrom crossing.

Study sample

The study sample consists of trips taken on the two ferries for which we have data. The data is administrative data from VLTC and covers the universe of trips taken at the Adowso - Ekye Amanfrom and Kete - Krachi crossings from 2013 – 2018. The data is based on financial records of daily crossings that have been aggregated to annual, quarterly and monthly totals by VLTC and MCC project documents.

Primary data collection

No primary data collection is planned.

Secondary data

We would use administrative data obtained from VLTC. The data is annual data from VLTC on ferry traffic at the Adowso - Ekye Amanfrom and Kete - Krachi for the years 2013 to 2018 (Okyerere Appiah, 2019). VLTC has shared this data with us already, but our initial review of the

MEMO TO: Cindy Sobieski, Jack Molyneaux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
DATE: 5/13/2019
PAGE: 5

data shows the level of detail in the VLTC data varies by year and is sometimes incomplete. Currently our data from the post-compact period includes the following information:

- **2018:** monthly traffic volume and revenue, disaggregated by vehicle classes (e.g., motorcycle, salon car, 3 ton truck), passengers, livestock (large and medium), and baggage (25 kg).¹
- **2016 – 2017:** monthly traffic volume and revenue, disaggregated simply into vehicles or passengers.
- **2013 – 2015:** quarterly traffic volume and revenue, disaggregated simply into vehicles or passengers.

Our source for pre-compact data on ferry traffic is the due diligence report, “Assessment of Late Volta Ferry Service: Adowso to Ekye Amanfrom” (Jacobs, 2006). This report combines data from VLTC and published reports, showing the number of two-way trips conducted by people and vehicles per annum (1990-2005) for the Adowso - Ekye Amanfrom crossing. This data includes the following information:

- **1990 – 2003:** annual traffic volume, disaggregated simply into vehicles or passengers.
- **2004 – 2005:** monthly traffic volume, disaggregated simply into vehicles or passengers.
- **2006 – 2028:** annual projections on the expected traffic volume under pessimistic, base, and optimistic scenarios, disaggregated by vehicle classes (e.g., motorcycles, cars, vans).

Analysis plan

We would conduct the following analyses to address RQ1:

1. Provide a descriptive summary of the annual, and monthly distributions of vehicles, vehicle classes, and passengers that traveled aboard the *Millennium Challenge* and *Freedom and Justice* for 2018. We will identify peak monthly volumes and assess whether the composition of vehicles and share of freight traffic change over the course of the year.
2. Plot traffic growth over time at both crossings to show annual trends in vehicle and passenger traffic volume for all years since the installation of the ferries (2013-2018). We will calculate and compare annual traffic volume growth rates for both crossings.
3. Assess any change in traffic trends at the Adowso - Ekye Amanfrom crossing before and after the Compact by comparing annual growth rates in traffic volume for 2013-2018 to pre-Compact trends (1990-2005) and trends prior to deployment of the new ferry (2006-2012). We will compare actual post-Compact traffic volumes to the annual traffic forecasts for

¹ The last categories refer to livestock and baggage not transported inside a vehicle.

MEMO TO: Cindy Sobieski, Jack Molyneaux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
DATE: 5/13/2019
PAGE: 6

optimistic, base, and pessimistic scenarios reported in the due diligence reports and used in the economic evaluation for the ferries (Jacobs, 2016).

These analyses will enable us to provide information on how the ferries are currently being used and will, to some extent, enable us to assess whether the ferry serving the Adowso - Ekye Amanfrom crossing has met the underlying objectives of the program logic. Although this analysis will not allow us to link the ferries to growth of agriculture in the Afram Basin Zone, we can partially assess whether the intermediate outcome of better movement of goods and people has been realized.

D. Qualitative approach

MCC did not request the development of a qualitative approach.

E. Challenges

Limitations of interpretations of the results

Our review of the post- and pre-compact data suggest several limitations in our ability to address MCC's RQ1. First, the different levels of disaggregation over time (year, quarter, month) and vehicle class (all vehicles and discrete classes) limit the comparisons we can make across time to simply measuring the trend in annual traffic volume. Our analysis of vehicle composition will be based on cross-sectional data from 2018 only, so we will not be able to assess whether truck volume has changed at the Adowso – Ekye Amanfrom crossing. Second, we lack pre-compact data on the Kete - Krachi crossing, since it was not part of the original Compact design, so we cannot make any pre-post comparisons for this crossing.

With the administrative data available to us at this time, we would be able to produce a brief analysis that addresses RQ1. However, this analysis may not be substantive enough to stand alone as a performance evaluation of the Ferry Activity. Instead, it could be integrated as a short section into the Ghana Roads Evaluation Final Report, especially as the Ferry Activity shares some of the program logic with the Trunk Roads Activity.

Risks to the study

We have already acquired the data necessary to undertake the evaluation and see no risk to the study.

F. Summary of methodology to estimate post-compact ERR

No analysis of post-compact ERRs is proposed.

4. Administrative

The proposed evaluation is based only on highly aggregated administrative data and does not involve human subjects. For a discussion of other relevant administrative issues, refer to section VI of the EDR.

MEMO TO: Cindy Sobieski, Jack Molyneaux
FROM: Anthony Harris, Alejandra Aponte, Delia Welsh
DATE: 5/13/2019
PAGE: 7

We propose to include this analysis as part of the draft final report that we will deliver in August.

5. References

- Caselli, Francesco, and Douglas Gollin. "Agricultural Productivity Growth and Economic Development in an Open Economy: The Case of Ghana." Working paper F-3025-GHA-1. London, United Kingdom: International Growth Center, 2012. Available at <https://www.theigc.org/wp-content/uploads/2012/04/Caselli-Et-Al-2012-Working-Paper.pdf>. Accessed November 2017.
- Cooke, Edgar, Sarah Hague, and Andy McKay. "Ghana Poverty and Inequality Analysis." UNICEF: 2016. Available at https://www.unicef.org/ghana/resources_10232.html. Accessed November 2017.
- Jacobs Consultancy. "Assessment of Lake Volta Ferry Service: Adowso to Ekye Amanfrom." Jacobs Consultancy, April 2006
- MiDA. "Monitoring and Evaluation Plan." Accra, Ghana: MiDA, Final version as of November 30, 2011.
- MiDA. Millennium Challenge Account (MCA) Ghana Compact Completion Report. Accra, Ghana: MiDA, September 2012.
- Okyere Appiah, R. (VLTC), personal communication, April 18, 2019.
- Okyere Appiah, R. (VLTC), personal communication, April 11, 2019.
- Rangarajan, Anu, Delia Welsh, Anthony Harris, Patricia Costa, Laura Meyer, Ariel BenYishay, Sarah Hughes, Seth Morgan and Ali Protik. "Design Report: Evaluation of the Ghana Roads Activities." Submitted to Millennium Challenge Corporation, October 31, 2018.
- Welsh, Delia, Anu Rangarajan, and Anthony Harris. "Trip Report: Ghana I Roads Project evaluation design." Memorandum to Sarah Lane, Jack Molyneaux, Cindy Sobieski, and Hana Freymiller, Millennium Challenge Corporation, February 13, 2017.