



Cao Lanh Bridge Impact Evaluation Report

July 2021

Table of Contents

Table of Contents	2
List of Figures	Error! Bookmark not defined.
List of Tables	Error! Bookmark not defined.
Executive Summary	3
1..Introduction	9
1.1 Background	9
1.1.1 The Cao Lanh Bridge Project (CLBP)	9
1.1.2 CLBP's Impact Evaluation	9
1.2 Endline Survey	10
1.3 Report Structure	10
2..Methodology	11
2.1 Impact Hypotheses	11
2.2 Impact Evaluation Design	11
2.3 Quantitative Survey of Households and Communes	13
2.3.1 Survey Implementation	13
2.3.2 Survey Instruments	13
2.3.3 Regression Method	14
2.4 Qualitative Interviews	15
2.4.1 Research Approach and Methodology	15
2.4.2 Research Tools	16
2.5 Limitations	16
3..Impact Evaluation Results	18
3.1 Households and Communes	18
3.1.1 Demography and Education	18
3.1.2 Healthcare	19
3.1.3 Access to Facilities	20
3.1.4 Employment and Household Income	23
3.1.5 Household Assets	29
3.2 Businesses	29
3.2.1 Transport Operators	29
3.2.2 Businesses in Industrial Parks	34
3.2.3 Local Authorities – Provincial and Regional-Level Impacts	37
3.3 Benefit Cost Analysis	42
3.3.1 Effects of COVID-19	42
3.3.2 Changes in Vehicular Usage at Cao Lanh and Vam Cong	43
3.3.3 Key Impacts	44
4..Conclusion	46
5..Reference	48
6..Appendix A: Survey Tools	49

Executive Summary

Background.

The Cao Lanh Bridge Project (CLBP) forms a part of the Central Mekong Delta Connectivity Project (CMDCP), is aimed to improve transport services within the Central Mekong Delta and to Ho Chi Minh City by eliminating the difficulties of crossing the Cao Lanh and Vam Cong ferries in Dong Thap and Can Tho. The Project is estimated to benefit approximately 170,000 road users and 5 million nearby residents in Dong Thap, Can Tho, and An Giang. It is expected to improve access to social and health services, promote local agro-industry, boost exports, attract investments to the provinces and enhance regional connectivity. It consists of three components:

- Component 1: the Cao Lanh Bridge (2.0 km) and approach roads (5.4 km)
- Component 2: the interconnecting road (15.7 km)
- Component 3: the Vam Cong Bridge (2.97 km) and approach roads (4.08 km)

The Australian Department of Foreign Affairs and Trade (DFAT) funded the Cao Lanh Bridge and its approach roads AUD 168 million. Adam Smith International (ASI) and the Mekong Development Research Institute (MDRI) were commissioned by the DFAT to conduct an impact evaluation. This impact evaluation assignment aims to test the overarching hypothesis that *the CLBP will generate accessibility and mobility improvements that lead to wider socio-economic development benefits within and among the three provinces.*

Research design of CLBP's impact evaluation.

A mixed-method approach was adopted to gather both quantitative and qualitative data for an assessment of the socio-economic impacts of the CLBP on the beneficiaries in the project area. These include positive and negative, intended and unintended, short and long-term impacts on individuals, households, businesses, and the entire provincial and regional socio-economic status. For complete estimates of the connectivity benefits, the impacts of the entire CMDCP were examined wherever possible as the Cao Lanh and Vam Cong bridges and connecting expressways form a part of it. Data were collected through three rounds of survey:

- (i) **Baseline survey** (March & April 2017): to collect benchmark data before the inaugural of the CMDCP.
- (ii) **Midline survey** (June 2019): to assess the initial impacts, if any, of the CMDCP.
- (iii) **Endline survey** (June 2021): to collect the final dataset to evaluate the impacts of the CMDCP and provides inputs for this report.

The second approach, Benefit-Cost Analysis (BCA) aims to quantify and monetize the economic benefits and costs of the Project through three traffic surveys. Results of the first two were incorporated in the first BCA report. It quantified changes in travel time and distance, patterns of vehicular traffic, and quantities of transported passengers and freight. The second report, summarized in this report, confirms previous findings.

The Covid-19 waves have induced adaptations in the implementation of data collection and changes in socio-economic activities and travel patterns, which might have undermined the impacts of the Project.

Endline survey objective.

The endline survey was designed to assess the Cao Lanh Bridge and the Connectivity Project's impacts on individuals and households through the alterations in their socio-economic conditions since the baseline survey. The quantitative survey sample was 2,015 households, former participants of the baseline survey, and officials of 117 corresponding communes. 36 qualitative interviews were conducted with representatives of transport operators, businesses in industrial parks, economic zone authorities, and provincial Social and Economic Departments. They were aimed to explore the impacts on businesses and the overall provincial and regional socio-economic picture.

Endline impact evaluation methods.

To measure the causal effect of the Project on beneficiaries, the difference-in-differences (DID) estimator is employed. The treatment variable is the distance from households to the nearest bridge, either Cao Lanh or Vam Cong. We use a series of outcome variables according to the theory of change including individual-level outcomes (education, healthcare, employment, and income) and household-level outcomes (income and appliances). It is assumed that households living closer to the bridge are more likely to benefit from the Project than their comparison groups. In other words, living far from the bridge decreases the outcome of households.

BCA technique compares the total costs of the Project with its benefits. This enables the calculation of the net cost or benefit associated with the programme and justifies its value for money.

Findings.

Presented in the report are (1) the patterns of and the Project's quantified effects on the socio-economic activities by individuals and households in Dong Thap, An Giang, and Can Tho; (2) the impacts on local businesses' operation and cost savings; (3) the Project's spill-over impacts on the entire socio-economic development of the studied provinces and Mekong region; and (4) BCA findings on the Project's value of money.

Individuals and households

An increase in the enrolment rate of children in the three surveyed provinces and city was recorded at all the **education** levels. Compared to 2017, 31% more of children in the 3-5 aged group enrolled in kindergartens and over 10% more of the secondary age group were admitted to lower-secondary and upper-secondary schools in 2021. The pattern in which rural children were less likely to attend school than urban ones has been changed in the last five years. Likewise, the rate of schooling-aged girls receiving an education was not higher than that of boys at the lower education levels but was at the upper secondary level (9%). Although improved infrastructure was assumed to improve access to education, regression analysis results did not reveal any significant effects of the distance to the nearest bridge on children's school enrolment.

Over the last 12 months, 62.4% of residents received medical treatment and health check-ups and consulted a doctor, which was 7.4% lower than it was in 2017. Pharmacies continued to be the most frequently visited **healthcare** facility, but private health centers were visited by fewer people (8.7%). Travel restrictions and private health service providers' poor compliance with COVID-19 preventive measures could induce residents' inclinations. The OLS regression results confirmed the hypothesis that the Project would improve local people's access to health services. People living closer to the bridge had higher tendency to visit central-level hospitals.

The inauguration of the Cao Lanh and Vam Cong bridges seemed not to alter people's demand for travelling to major public places and city centres. District hospitals firmly held their position as the top popular destination whilst visitors to wholesale markets increased the most (9.6%). Although the average travel distance from households to all the facilities was considerably shortened, no change in travel time was observed. However, regression analysis found positive correlations between the distance to the bridge and the distance to wholesale markets and travel time to Cao Lanh and Long Xuyen cities. To **access facilities**, local people tended to use motorcycles the most and switch their preference to private cars instead of public transport services like coaches. Comparing the use of the two bridges, the volume of travellers across the Cao Lanh Bridge within 30 days prior to the survey date was much higher than that of the Vam Cong bridge, but the frequency of travel on the former was much less than that of the latter. The primary purpose for crossing the two bridges was commuting to work, the second topmost was visiting relatives/friends, and the third was purchasing house appliances/ production materials. This supports the hypotheses that the Project would boost the provincial residents' employment opportunities and improve their social welfare.

The **employment** rate reached 79.6% in 2021, 2.2% higher than in 2017. The jumps of 4.7% in agriculture jobs and 4.2% in paid works pulled An Giang's working rate up by 3.7%. Those under 30 years old and in the top income quintile were more likely to join the workforce in recent years (5.1% and 7.1%, respectively). The positive effect of the CLBP on residents' working status was statistically significant. A 10-percent increase in the mean distance to the bridge (equivalent to 2.5 km) leads to a 0.5%-decrease in people's propensity to work. Regarding gender, the rate of working females remained 15.5% lower than that of males in 2021. The persistent disparities

in domestic task division and income between the two genders might explain the non-alteration of their working patterns. Despite COVID-19 direct and severe impacts on women's job opportunities, especially in the manufacturing and service sectors, their employment rate increased by 2.7%, 1.4% higher than men's. This is because 4% of working females switched to or did agriculture business as an additional source of livelihood. By sector, paid jobs continued to be taken by nearly 60% of the workers, while self-employment in agricultural and non-agricultural sectors was relatively equally secured by over 30%. Higher-income sub-groups showed a higher likelihood to be employed in 2021. The impact of the CLBP on employment opportunities does exist. Regression results found that if the distance to the bridge increases by 10%, people's probability to take up a wage, farm, and non-farm occupation rises by 0.26%, 0.27%, and 0.17%, respectively.

Annual **agriculture income** of households dipped down VND 4.4 million during the 2017-2021 period. The overall decline trend was visible across all the sub-groups, except those headed by under 30-year-old persons. A major section of agricultural land and production in the questionnaire was adapted to a phone survey, which might result in the incomplete estimation of income from agricultural products. COVID-19 has largely affected the movement and domestic and international consumption of farming produce, consequently their price and farmers' income. Compared to the income loss of rural and male-head households, that of their counterparts was much less. The household's agriculture income structure did not witness any remarkable changes. Crops were the topmost contributor despite a 6.1-percent decrease. The second was the revenues from raising livestock, 10.6%. The contribution by fisheries and forestry was minor and stable over the past five years.

The per capita **income of individuals** dived by 16.2% to reach VND 14.6 million in 2021. The residents in An Giang could earn 74.8%, Can Tho 83.3%, and Dong Thap 87.9% of their 2017 income. Except for the inelastic sources of income like pension, unemployment benefits, or grants, all other sources, including wages, investments, property renting, savings interests, and so on, were prone to COVID-19. Although the pandemic underestimated the impacts of the Cao Lanh and Vam Cong bridges, their construction was expected to yield positive effects on residents' economic status, mainly resulting from employment obtainment. Indeed, the elasticity of the per capita wage to the distance to the bridge is estimated at -0.295. This indicates the positive impacts of access to the bridges on per capita wage.

COVID-19 caused the household income of 62.7% of survey respondents to decline and reduced the income of 18.3% of households by 50% or more. The households headed by the older persons and classified as higher-income sub-groups were less prone to the pandemic than their comparable sub-groups. Of the four income sources, **household income** deriving from farm business reduced the most, VND 5.5 million compared to 2017 and loss tended to be more substantial among higher-income quintiles. On the contrary to the declining trend prevalent in all other means of livelihood, salaries increased by VND 3.5 million and became the dominant source of income (51.8%). Wage income made up 56.8% of female-headed households, but 49.4% of male-headed ones. It suggests that females were potentially likely to benefit more from the bridges than males. As wages increased while other income sources decreased, the contribution of the monthly payment in household income became larger, particularly among those headed by under-30-year-old persons and belonging to the higher-income quintiles. The effect of the bridge was statistically significant on the per capita income of households. If the distance to the bridge increases by 10% (equivalent to 2.5 km), per capita income of households, non-farm income, and wage income decreases by 1.4% (equivalent to VND 360 thousand), 7.7%, and 4.1%, respectively. However, the effect of the bridges on different sub-groups is not statistically significant.

The additional household income thanks to the Project was expected to translate into the purchase of **household assets**. The most common durable assets remained motorcycles, colour TVs, and fridges. The ownership rates of washing machines, fridges, and air conditioners jumped by 19.8%, 18.4%, and 12.1%, respectively. In contrast, pumping machines, one type of production facility, lost their popularity by 6%. Yet the quantitative analysis results did not reveal any statistically significant effects of the Project on residents' possession of household appliances, an indicator of the improvement in living conditions.

Businesses

Intra-provincial and inter-provincial **transport operators** both accredited **transport time reduction**, **predictability of arrival time**, and **operation cost savings** to the Cao Lanh Bridge and the Connectivity Project. The total travel time from one side to the other side of the Tien River, including boarding time at the

Cao Lanh and Vam Cong ferries up to two hours or taking an alternative 50-km longer route for 16-ton-or-above vehicles, is now cut down to 15 minutes. Traffic congestions at the ferries which used to cause unpredictable arrival times of a trip and consequently explicit and implicit costs, are now resolved. Passenger and freight transporters enjoy these cost benefits besides savings from wages for drivers per trip, ferry tolls, fuel, vehicle maintenance costs, and paying for intermediaries. These qualitative findings confirm the overarching hypothesis that the Project will lead to improvements in accessibility and mobility and therefore, socio-economic development benefits for the three provinces and city. A more complete transport system with the Cao Lanh and Vam Cong bridges is said to boost logistics companies' establishment of new branches at the port and transport operators' **possession of larger container fleets**. The BCA report estimated, the average number of containers crossing the Cao Lanh Bridge per day was 142 and via the Vam Cong Bridge was 364.

Thanks to the Project, Cao Lanh city has been transformed into an **intra-provincial bus transit centre**, connecting two sides of the Tien River, promoting **tourism development** in Dong Thap. The ease of inner provincial movement to tourist spots such as Nguyen Sinh Sac historical site, Xeo Quyt, and Sa Dec flower village has contributed to the annual growth of over 16% of tourists (4 million in 2019), instead of 8% in 2015. Nevertheless, Cao Lanh has not yet been an inter-provincial bus transit centre, partly due to its geographical disadvantages compared to Can Tho and Kien Giang and probably unlocking its full potentials for ecotourism.

The Project is regarded as a boost factor for the **provincial transport sector**, upgrading facilities and generating **employment opportunities**. The comfort and shortened time of travel encourage passengers' movement desires. The transport demand of goods, particularly agricultural products, is now shifted from via inland waterways to via road. The cost of transporting 100 tons of rice by truck and container is reduced by 11% compared to by cargo ship. Alternative economical and safe routes thanks to the Project enable transport businesses to meet more of clients' demands. There exists a sharp growth in the volume and types of means of transport owned by transport operators. Typically, a company's vehicle fleet has increased by 3.3 times over the past five years. The expansion generates demand for employees in the transport sector, but the provincial pool of workers, especially drivers, has not yet met the demand.

Other **businesses in the industrial parks** also largely benefit from the Cao Lanh Bridge and the Connectivity Project. The exporters of finished goods to international markets via nearby ports now have better time and distance saving alternatives than via ferry. The businesses located in the Binh Hoa, Binh Long, Thot Not industrial parks near the NR91 gain more from the Project than those in Sa Dec. **Mobility** improvements were recognized in the movement of both inputs and outputs. Businesses save 1-1.5 hours per trip and guarantee the quality of raw materials, especially fresh agricultural products. The Project and easily managed transportation improve agro-processing businesses' **access** to input suppliers and potentially expand their export markets. The Kovie Vina Company has doubled its number of suppliers since the inauguration of the bridges and the Sethia Hemraj Rice Oil Company is expanding input markets to Can Tho and An Giang.

Employment-induced migration to major economic centres like Ho Chi Minh City and Binh Duong has made regional disparity persistent. The recent establishment of industrial hubs in the Southeast region of Vietnam generates non-farm jobs but exaggerates the difference. The Project has attracted investments into its nearby areas, **deepening employment opportunities** for residents and **bridging the regional gap**. Dong Thap attracted 56 projects valued over VND 7,300 billion in 2018 and 2019 and An Giang recorded 347 newly established enterprises with total registered capital of VND 4,535 billion despite the COVID-19 impacts in the first half of 2021. The Project improves paid workers' **access to labour markets** by reducing commute time and increasing journey flexibility for no reliance on ferry schedules. Workers employed by the Cadovimex II Company (Sa Dec industrial park) can reduce their daily commute time by 25%.

There was **no evidence for the increase in containerized road freight** and the resulting achievement of economies of scale. Barge and truck remain dominantly used by the businesses in industrial parks, especially for transporting fresh aquaculture produces. The large loading capacity of barges, the suitability of trucks to the entire provincial transport system, and the abundance of truck goods transporters along with competitive pricing strategies explained the deferral of freight transport switch to containers. Thanks to the convenience of freight transport via the bridges, the NV Apparel Limited Company increased their trucked goods trips per day by two

to four times compared to 2017, facilitating production expansion and achieving economies of scale. Savings of fuel costs were mentioned but not exact estimates.

Provinces and the Central Mekong Delta

Travel within Dong Thap and to other provinces used to heavily rely on the Cao Lanh and Vam Cong ferries. The CLBP now bridges two sides of the Tien River and the entire Connectivity Project forms a vertical transport axis in the central Mekong Delta. The connectivity between Dong Thap and local airports improves in terms of time and distance. To illustrate, if taking the route via the two bridges, the travel distance and time from Cao Lanh city to the Can Tho international airport is shortened by 12 km and 24 mins (19%) compared to the conventional route via the My Thuan Bridge and Vinh Long. The benefits for travelers from Cao Lanh to Rach Gia domestic airport are even more significant. Dong Thap will gain more transport advantages on the routes to those airports after the connecting roads are upgraded to expressways. An inter-provincial **comprehensive road infrastructure system** is planned and under construction to connect Dong Thap with other routes. Upon the completion of expressway projects, disruptions in the transportation of goods and passengers inside Dong Thap, to Ho Chi Minh City, and among the Central Mekong Delta provinces will be removed.

The Cao Lanh and Vam Cong bridges have proven to beboost economic development in Dong Thap and An Giang, and stimulate **investments in the Central Mekong Delta**. The total number of investments in Dong Thap was 26 with a total registered budget of VND 2,000 billion in 2018 and 30 projects valued at VND 5,300 billion. An Giang received over VND 17,600 billion in 2019, more than VND 29,400 billion in 2018, and roughly VND 15,300 billion in 2017. However, the flow of investment into those provinces is foreseen to decline under the COVID-19 pandemic. One of the biggest will be the high-tech dairy farming and milk processing project by TH True Milk in An Giang in 2021. Better connectivity between An Giang and Ho Chi Minh City, the biggest market in Southern Vietnam, eliminates the concerns over transit time and delivery costs of raw and processed agro-products and promotes the OCOP Project in the province. The share of high-tech application projects is on an upward trend while traditional sectors such as aquaculture and farming product processing, garment, leather, and footwear continue to receive a major part of investment funds. Real estate giants like Vingroup, FLC, and T&T have poured investment funds into residential complexes in the provinces. These projects improve residents' living conditions and social welfare and deepen their employment opportunities. It is confirmed that the industrial parks closer to the Cao Lanh and Vam Cong bridges and connecting roads tend to attract potential investors more than those further from the Project sites. Dong Thap and An Giang have adjusted their provincial master plans on industrial parks to take advantage of the Connectivity Project.

Despite tourism potential, this sector was under-developed in Dong Thap largely due to the lack of connection with the tourism hubs of Can Tho and An Giang. This hindrance is removed since the inauguration of the two bridges and connecting roads. Local authorities of Dong Thap and An Giang believe that local **tourism** would boom without COVID-19. The number of stay-over tourists to An Giang gained 1% during the 2010-2015 period but 15-20% in 2020. However, COVID-19 underestimated the value of the Project by reducing the number by 80% in the first half of 2021. Compared to Can Tho, Dong Thap falls short appealing tourist sites and traditional cuisines for tourism development. Cao Lanh Bridge and Sa Dec with a flower village and an ancient house – famous for “The Lover” novel and movie by Marguerite Duras should be promoted to attract visitors.

Benefit-Cost Analysis

Regarding **traffic volume**, the use of the Cao Lanh and Vam Cong bridges in 2020 increased by 50% and 28%, respectively. 6,800 and 4,900 four-or-above-wheel vehicles per day were estimated to turn into the two bridges from other routes. Comparing 2020 and 2017, there were 84% and 41% increases in the total numbers of users of the Cao Lanh Bridge and Vam Cong Bridge. The rate of females, which was already lower than males', dropped by 16% since 2017. The total daily freight transported across the bridges was almost 3.6 times as large as that via the two ferries. The surge of Covid-19 cases and travel restrictions since late May 2021 reduced traffic volume across the bridges by 30% compared to March 2020.

In terms of travel **distance and time**, travelling via the bridges on average could save 4+ wheelers over 10 km and one hour per trip and motorcycles 31 minutes despite travelling a slightly longer distance. Some improvement in the **predictability** of arrival time and **safety** was recognized by roughly 90% of bridge users in

2020 while opposite views were in only 2%. The Project's **value for money** was evident in the benefit-cost ratio (BCR), net present value (NPV), and economic internal rate of return (EIRR). The BCR for the Cao Lanh Bridge was 2.1, NPV was USD 194.1 million at the 7% discount rate, and EIRR was estimated at 12.5%. These performance indicators for the entire CMDCP were even more impressive.

To summarize, the investment in the Cao Lanh Bridge has yielded positive results on the socio-economic conditions of individuals, households, businesses, provinces, and the Central Mekong Delta and proved value for money. Its regional impacts will be maximized upon the completion of connecting expressways, hence the acceleration of their construction is necessary. In the long term, the diversity, quality, and flexibility of vocational training courses should be enhanced to meet the increasing demand for skilled labor in traditional and modern industries. Employment opportunities will continue to be deepened and expanded, and income improvements are foreseen for the increase in quantity and value of current and future investments in the project areas. The evaluation includes a before-and-after approach with time-series and panel data to measure socio-economic benefits, and three surveys conducted in 2017, 2019 and 2021

1. Introduction

1.1 Background

1.1.1 The Cao Lanh Bridge Project (CLBP)

Vietnam is an export-led economy and is widely known as the world's second-largest rice exporter. Eighty-five percent of the country's annual rice export is produced in the Mekong Delta. With the majority of total areas (4 million hectares) as agricultural land (2.4 million hectares), the region plays a vital role in Vietnam's domestic food distribution by contributing 48% of national food production, 57% of national aquaculture production, and 41% of national capture fishery (ICEM, 2012). To sustain the economic development of this region, the Government of Vietnam decided to upgrade the National Highway 2A (NH2A) as a parallel arterial link between the Mekong Delta and Ho Chi Minh City. The link aims to enhance the access of the Delta's agro-industries to regional/international export markets and relieve traffic congestion caused by rapidly increasing motorization on National Highway 1A (NH1A) – the long-established arterial link between the two regions.

Accordingly, the Central Mekong Delta Connectivity Project (CMDCP or herein after referred as "the Project"), including the Cao Lanh Bridge Project (CLBP), was implemented to remove bottlenecks on NH2A caused by ferry crossings at Cao Lanh (Dong Thap) and Vam Cong (Can Tho)¹. The Project is expected to bring inclusive development to poorly connected areas by improving access to essential social services, stimulating the exports of local agro-produces via extended connectivity to major inland ports in the Delta and the Greater Mekong Sub-region. An estimated 170,000 road users will benefit daily from the Project, and 5 million residents in Dong Thap, Can Tho, and An Giang will benefit from improvements in living standards.

The Project has three components²:

- Component 1: the Cao Lanh Bridge (2.0 km) and approach roads (5.4 km)
- Component 2: the interconnecting road (15.7 km)
- Component 3: the Vam Cong Bridge (2.97 km) and approach roads (4.08 km)

The Australian Department of Foreign Affairs and Trade (DFAT) funded AUD 168 million for design and construction of the Cao Lanh Bridge and its approach roads. To quantify socio-economic impacts of the investment, DFAT commissioned Adam Smith International (ASI) and the Mekong Development Research Institute (MDRI) to carry out the impact evaluation assignment.

1.1.2 CLBP's Impact Evaluation

The prime objective of the assignment is to **evaluate CLBP's socio-economic impacts on selected sub-populations in the project area**. It seeks to establish whether the bridge has made a difference in the lives of people in the target area by assessing the direct and indirect causal contribution of the bridge to change in people's lives. This includes an assessment of the positive and negative, intended and unintended, primary and secondary long-term impacts that result from the Cao Lanh Bridge. Besides, for complete estimates of the connectivity benefits, the impacts of the entire CMDCP were also examined wherever possible as the Project is conceived as an integrated project that requires the completion of both the Cao Lanh and Vam Cong bridges, and the connecting expressway.

In this assignment, a mixed-method approach is employed to integrate various evaluation methods at every stage of the evaluation process, drawing on both quantitative and qualitative data for contribution and attribution

¹ Key constraints along NH2A included the ferry crossings at Cao Lanh and Vam Cong on the Hau and Tien Rivers respectively, at which cumulative delays per vehicle typically averaged one hour per trip.

² With its construction starting in October 2013, the Cao Lanh and Vam Cong Bridges were inaugurated on 27 May 2018 and 19 May 2019 respectively.

analyses. Discrete forms of the evaluation analysis are prepared based on conventional benefit cost analysis (BCA)³ and statistical techniques in causal modelling (Diminishing Effects approach). Then, a before-and-after approach with time-series and panel data is adopted to measure socio-economic benefits that the CMDCP has contributed in the project areas via three rounds of survey:

- (iv) **Baseline survey** in March and April 2017 to collect benchmark data before the opening of the CMDCP.
- (v) **Midline survey** in June 2019 to collect data to assess the initial impacts, if any, of the CMDCP.
- (vi) **Endline survey** in June 2021: to collect the final dataset for the impact evaluation of the CMDCP and was subjected to this report.

1.2 Endline Survey

The endline survey consisted of both quantitative and qualitative interviews. The quantitative interviews were carried out to assess the Project' impacts on the residents in the project areas by measuring the changes in their socio-economic conditions since the baseline survey. The quantitative study sample consisted of 2,015 households, who had participated in the baseline survey and officials of 117 corresponding communes. At the same time, the qualitative study was designed to explore the impacts of the Project on businesses and related stakeholders via 36 in-depth interviews (IDIs) with four main groups of informants, which are representatives of transport operators, businesses in industrial parks, economic zone authorities and Social and Economic Departments of the Government in three provinces.

1.3 Report Structure

The impact assessment report has seven sections. Section 1 presents a brief description of the CLBP, rationale, and objectives for its impact evaluation. Section 2 outlines the employed evaluation methodology and provides details of the framework design for quantitative and qualitative studies. Section 3 reveals the impacts of the CLBP and CMDCP on households, businesses, and related stakeholders in the project areas with findings from the mixed approach. Results of the BCA – the second strand of the impact evaluation, is also briefly displayed in this section⁴. Section 4 wraps up the report with a summary of findings and puts forward recommendations to ensure the sustainability of the impacts. Finally, references and several technical appendices are presented in the last three sections of the report.

³ The Benefit Cost Analysis (BCA), also known as economic evaluation, is a second strand of the impact assessment. The BCA had the objective to assess the economic merit of the Project to the residents in the project areas, and to Vietnam as a whole. The BCA is also the primary means to which DFAT would assess the Project's Value for Money (VfM), in terms of economy, efficiency and effectiveness.

⁴ Please refer to the full report at: <https://bit.ly/3l2tFJW>.

2 Methodology

2.1 Impact Hypotheses

This evaluation is a systematic, empirical investigation of the socio-economic impacts of the DFAT-funded Cao Lanh Bridge Project (CLBP). It is designed to test the primary hypothesis that:

1. The CLBP will generate accessibility and mobility improvements that lead to wider socio-economic development benefits within and among the three provinces of Dong Thap, An Giang, and Can Tho.

In addition, there are seven subsidiary hypotheses, which together inform the primary hypothesis, as follows.

2. The CLBP will generate additional socio-economic benefits for Cao Lanh urban residents (including improved access to health, education and cultural facilities).
3. The CLBP will expand and deepen the labour market areas for Cao Lanh residents, with improved road access to other provincial centres for additional employment opportunities.
4. The CLBP will lead to growth in containerised road freight across all three provinces (achieving economies of scale, reduced numbers of individual small truck movements, and lower costs per unit of freight).
5. The CLBP will stimulate the development of Cao Lanh as an intra-provincial and inter-provincial bus passenger transit centre, with increased tourism visitation and quicker access to/from Ho Chi Minh City.
6. The CLBP will stimulate growth in transport and storage-related enterprise facilities and employment within all three provinces.
7. The CLBP will strengthen the Dong Thap provincial economy, with the creation of demand for bridge/road building materials and the acquisition of additional building skills and opportunities.
8. The CLBP is expected to improve the social welfare of the population within the three provinces and in relative road corridors, and be assessed as being an effective aid investment, yielding positive results and value for money.

2.2 Impact Evaluation Design

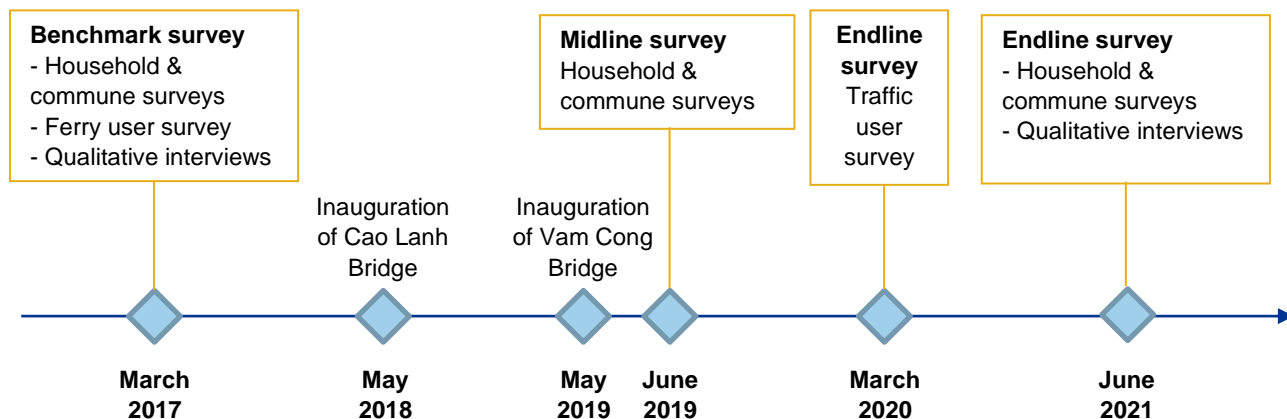
In order to test the above hypotheses, a mixed-method evaluation was designed integrating a range of evaluation methods at every stage of the evaluation process, drawing on both qualitative and quantitative data for contribution and attribution analyses. The evaluation design was based on the use of conventional Benefit-Cost Analysis (BCA) and statistical techniques based on causal modelling (Diminishing Effects approach). Both approaches had been prepared as discrete forms of analysis. Time-series and panel data were also used appropriately to measure the socio-economic benefits that the Cao Lanh and Vam Cong Bridges contributed to the surrounding area. Besides, case studies, in-depth interviews and focus group discussions were designed to obtain qualitative evidence and success/failure stories to facilitate learning about enabling and disabling factors to development as well as for public diplomacy.

This study adopted a before-and-after approach. This includes the collection of benchmark data before the completion of the Cao Lanh and Vam Cong Bridges and the connecting roads, with two subsequent data collections in 2019 and 2021, after the two bridges were inaugurated.

Specifically, in March 2017, a benchmark survey was conducted in the surrounding areas of the Cao Lanh and Vam Cong bridges to collect baseline data for the evaluation. The benchmark survey was composed of a household and commune quantitative field survey, a ferry user survey, and a qualitative survey. The quantitative survey was conducted with around 2,000 households, including 1,000 households in Dong Thap, 500 households in An Giang, and 500 households in Can Tho. In each commune having the surveyed households,

an additional commune questionnaire was asked to the commune leader to obtain a general overview of the commune. Besides, a ferry user survey, including a 24-hour traffic count and an Origin-Destination survey, was implemented at the Cao Lanh and Vam Cong ferries to collect traffic data before the bridges were used. Qualitative interviews, including key informant interviews with transport operators, business in the industrial parks, and the local authorities, as well as focus group discussions with households near the Cao Lanh and Vam Cong ferries, were also conducted to understand the local habitants and enterprises' expectations of the upcoming bridges.

Figure 1. Timeline of the impact evaluation



Source: The research team

In June 2019, the first impact evaluation, also known as midline survey, was implemented by revisiting 1,000 households in Dong Thap to assess the impact of the Cao Lanh Bridge, which was opened in May 2018. This survey was redesigned to intentionally exclude household sample in the neighbouring provinces An Giang and Can Tho to cope with the delay of Vam Cong Bridge construction. While the survey was delayed to June to observe initial changes of the area due to the Vam Cong Bridge, it was expected that there is no identifiable impact on households of these two provinces as well as enterprises in the region at that moment.

The first impact evaluation measured direct effects of the Cao Lanh Bridge including:

- Improved access to employment opportunities
- Improved access to health, education and cultural facilities
- Improved access to local markets

Other indirect and induced effects of the Cao Lanh Bridge and the Connectivity Project could be realized through reduction in the levels of poverty with increasing income, improved access to employment and thus improvements in household quality of life as well as improved transport access. The Cao Lanh Bridge and the Connectivity Project might also have effects through induced developments in tourism, social development (health and education services), and reduced time burdens, especially for women.

The second impact evaluation survey, or endline survey, was implemented in two parts. First, in March 2020, a traffic user survey was conducted at the Cao Lanh – Vam Cong highway to collect data of the vehicles travelling through the two bridges. Similar to the 2017 ferry user survey, the 2020 traffic user survey was composed of a short survey with the road users and a 24-hour traffic count using traffic videos of the bridges' Management Units and field videos recorded at 6 ramps leading to the bridges and connecting highway. Those data were used specifically to measure the changes of traffic volumes before and after the construction of the Cao Lanh and Vam Cong bridges, as well as to evaluate the economic benefits of those bridges. Those evaluation results were reported in a separate BCA report which was already submitted to DFAT in 2020. This report was updated in 2021 using traffic count data from the videos of the bridges' management units and Dong Thap police to measure the changes of traffic volumes via the two bridges under the effects of COVID-19 pandemic.

The second part of the endline survey was implemented in June 2021 to capture the socio-economic changes in the area two years after the completion of the whole Connectivity Project. This survey round imitated the Benchmark household and commune survey over the sample of Dong Thap, An Giang, and Can Tho. In addition, qualitative interviews were conducted with the transport operators, businesses in the industrial parks, and some local authorities to complement the study with qualitative insights.

2.3 Quantitative Study of Households and Communes

2.3.1 Survey Implementation

The endline survey was conducted when a new wave of COVID-19 pandemic was prevalent in Vietnam, especially in the Southern provinces including Dong Thap, An Giang, and Can Tho. Numerous travel restrictions were implemented in the Mekong Delta to prevent the spread of the pandemic. Thus, a field survey like the one at baseline was impossible, and the research team had to switch all survey activities to phone survey.

The household and commune surveys were conducted from June 10th to July 3rd, 2021, using a computer-assisted telephone interviewing (CATI) method to collect data. Specifically, interviewers worked online, conducted phone interviews via a voice API and recorded the responses into tablets. The survey sample covered all 2,000 households participating in the benchmark survey, including 1,000 households in Dong Thap, 500 in An Giang, and 500 in Can Tho. A commune questionnaire was also asked to the leaders of each surveyed commune via phone.

Despite the difficulties of a phone survey, attrition rate of the endline household and commune surveys was at an acceptable level. In fact, phone interviews were successfully conducted with 1,674 households and 116 commune leaders. The number of participants varied among the provinces, with 884 households in Dong Thap, 410 households in An Giang, and 380 households in Can Tho.

2.3.2 Survey Instruments

A target of the impact evaluation is to identify and measure the socio-economic changes brought by the Cao Lanh Bridge and the Connectivity Project at the household level. To achieve that goal, the household survey needs to collect two types of data, namely a data to identify treatment and control groups and the socio-economic outcomes of the households at baseline and endline.

Since the Cao Lanh and Vam Cong bridges can be considered as a treatment affecting the whole Central Mekong Delta, it is impossible to identify an appropriate control group. Therefore, this study uses distance from the households to the nearest bridge among the two bridges as the treatment variable. This method follows the Diminishing Effect approach specified in the Design of Cao Lanh Impact Evaluation, which helps determine whether being close to the road and bridge have an impact on households' welfare. Using the GPS locations of the households collected in the benchmark survey, the research team calculated the distance from the households to the Project and used that information for the statistical analysis.

Meanwhile, the households' outcomes were obtained using a questionnaire similar to the one used in the benchmark survey so the baseline and endline data were comparable. Specifically, the household questionnaire was based on a given list of indicators described in the Design of Cao Lanh Impact Evaluation. The indicator list was proposed to measure the impacts of the Cao Lanh Bridge and the Connectivity Project based on the Theory of Change and the available data from VHLSS 2012, thus, it included indicators to measure the households' income, poverty status, assets, health and access to health care, education, production, access to infrastructure, living conditions, and sanitation. However, to meet the short time limit of a phone survey at endline, the questionnaire was revised, and some indicators were removed. The list of revised indicators is described in the following table.

Table 1. Revised list of indicators for the endline household survey

No	Indicator groups	Specific indicators
1	Household characteristics	Structure of population of each group (types of households, income quintile, sex, and age of household head) by:

No	Indicator groups	Specific indicators
		<ul style="list-style-type: none"> • Sex • Age • Education • Occupation • Poverty status
2	Education and access to education	Enrolment rate at every educational level by age, types of households, income quintile, sex, and age of household head.
3	Health and access to healthcare	Types of health care services used (i.e. illness, family planning, childbirth) by types of households, income quintile, sex, and age of household head. Reasons for using health care services (classified by types of medical services) by types of households, income quintile, sex, age of household head.
4	Production	Not covered by the endline questionnaire.
5	Income	Average monthly income per capita classified by types of households, income quintile, sex, and age of household head. Source of income (from agriculture, self-employment in non-agriculture, wage, other sources including remittances, public transfer) by types of households, income quintile, sex, and age of household head. Agricultural income structure (crop, livestock, forestry, aquaculture, agricultural service) by types of households, income quintile, sex, and age of household head.
6	Poverty Rate	Poverty rate measured by income by types of households, income quintile, sex, and age of household head.
7	Infrastructure	Travel time to the nearest market for goods purchase by types of households, income quintile, sex, and age of household head. Travel time to the nearest public facility like hospital, post office, and bank by types of households, income quintile, sex, and age of household head. Travel time to the capital cities of three provinces by types of households, income quintile, sex, and age of household head.
8	Assets	Ownership of valuable assets (car, motorbikes, truck, TV, other assets) by types of households, income quintile, sex, and age of household head.
9	Living condition	Not covered by the endline questionnaire.
10	Sanitation	Not covered by the endline questionnaire.

Source: *Design of Cao Lanh Impact Evaluation*

Information collected at the commune level also plays an important role in identifying the impact of the Project on household welfare. In this study, the commune questionnaire looked for all external factors in the socio-economic conditions of the household and homogenous information at the household level such as prices of common goods and production inputs. Since those data were already collected at baseline and midline, the endline commune questionnaire was shortened as much as possible to meet the time limit of the phone survey. Thus, it included three main questions:

- Question 1 asking for the poverty rate of the commune.
- Question 2 asking for the commune leader's opinion about the living standards at the commune.
- Question 3 asking for the number of factories located near the communes, and the number of local workers working at those factories.

2.3.3 Regression Method

Based on the collected household data at baseline and endline, this study applied statistical regression method to determine the impacts of the Cao Lanh Bridge and the Connectivity Project. Accordingly, measuring the causal effect of a project on beneficiaries is challenging if the beneficiaries are not randomly selected as in this

case. A widely used method to estimate the effect of a project is the difference-in-differences (DID) estimator. This is a quasi-experimental method and has been widely used in impact evaluation (Angrist and Pischke, 2009; Heckman et al., 1999; Wooldridge, 2010).⁵ The DID regression includes a time dummy variable, a treatment variable, and an interaction between these two variables. However, in this study, the Cao Lanh and Vam Cong Bridges affect most of households in the three provinces, leading to no well-defined control group. As a result, the effect of the project cannot be measured by a dummy variable as the traditional model. To address this problem, distance from households to the nearest bridge among the two bridges was used instead as the treatment variable. The research team assumed that households near the bridge are more likely to benefit from the bridge than households living far from the bridge. The DID regression equation with a continuous treatment variable in this study is expressed as follows.

$$Y_{i,t} = \beta_0 + Distance_i\beta_1 + T_t\beta_2 + Distance_iT_t\beta_3 + X_{i,t}\beta_4 + u_i + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ is a household welfare indicator of interest of household (or individual) i in year t (corresponding to the baseline and endline of this study). This welfare is denoted by a series of outcome variables according to the Theory of Change including education, healthcare, employment, income, and appliances. $Distance_i$ is the distance from household i to the nearest bridge (Cao Lanh or Vam Cong). This variable is continuous and measured in the logarithm form. T_t is the dummy variable of year which equals 1 for the endline survey, and 0 for the baseline survey. $X_{i,t}$ is the vector of exogenous control variables, including age and gender of the individuals (for individual outcomes), education, age and gender of household heads, household size, the proportion of children (less than 15), older members (above 64), and female members in households. The error term includes time-invariant u_i and time-variant $\varepsilon_{i,t}$.

According to the difference-in-differences estimator, β_1 captures the effect of living in an area that is close to the bridges, β_2 is the estimate of the difference in the outcome variable between the baseline and endline, and β_3 measures the effect of being close to the bridges with a consideration to the outcome changes over time. If the bridges yield a positive effect on the outcome, it is expected that β_3 is negative, meaning that living far from the bridges reduces the outcome of households.

The regression can be estimated using pooled data of the baseline and endline surveys. Besides, the panel data can be also used to estimate equation (1) using household fixed-effects. The household fixed-effect can estimate the time-invariant unobserved variables u_i . The variable 'distance' is unchanged over time and absorbed into the household fixed-effects. As a result, the coefficient β_1 is not estimated in the household fixed-effect regression. In this study, both the DID regression and the household fixed-effect regression were estimated and they produced similar results. Since the household fixed-effect regression is more robust, its results were used for interpretation.

It should be noted that both individual-level outcomes, i.e., education and employment of individuals and household-level outcomes, i.e., income and household assets, are available. A similar model specification can be used for both types of outcomes. The control variables can be different depending on whether observations in the regression are individuals or households.

2.4 Qualitative Study

2.4.1 Research Approach and Methodology

To complement the quantitative findings, the endline survey planned to implement a qualitative research similar to the one of the benchmark survey. Nevertheless, due to travel restrictions in the Mekong Delta to prevent COVID-19, the research team could only conduct the qualitative interviews via phone. Therefore, among the three research methods used at baseline, including in-depth interview, focus group discussion, and field

⁵ When randomization of the project location or beneficiaries is not possible, the second-best impact evaluation methods are instrumental variable regression and regression discontinuity. The instrumental variable regression requires an instrument which is correlated with the project selection but not error terms in the outcome equation. To apply the regression discontinuity method, we need to observe the selection criteria of the project and there must be at least a threshold to define the treatment and control groups. For example, to evaluate the effect of drinking alcohol on study, we can compare people aged from 18 and those below 18 years old. For the project in our study, we cannot find a suitable instrument for the instrumental regression as well as a selection criterion to implement the regression discontinuity method.

observation, only in-depth interviews (IDIs) was employed at endline to obtain information from the transport operators, businesses in the industrial parks, and some local authorities.

In-depth personal interview is an effective method to collect individual perspectives on a project impact. Through this approach, informants' opinions, perspectives, and experiences are captured and used to explore the issues associated with the project. An IDI guide was developed to provide structure for interviews with the various classes of informant. This included open-ended questions that were designed to collect information in flexible way. The key informant interviews (KIIs) conducted at endline is a special type of IDI with people who have an overall view of the community status, i.e., community leaders and professionals. The local authorities and businessmen, with their knowledge and understanding, can provide insight on the Project impacts on business and trade, as well as long-term impacts at the provincial and regional level that cannot be measured by the household survey.

Similarly, among the three research approaches at baseline including the rights-based approach, gender-sensitivity approach and participatory approach, only the gender-sensitivity approach corresponded to the phone interviews and was employed at endline. As gender issues are among the central concerns of the CLBP and DFAT, the endline KIIs applied the Gender-sensitivity approach to their interview guides. This approach determines that women are often more marginalized because of gender issues (gender needs, gender stereotypes, gender roles etc.) compared to men. Therefore, the impacts of the CLBP on women will be different to those experienced by men. In the KIIs with local transport operators and businesses, that gender aspect was incorporated in the topics of labour commutation and employment opportunities for women.

In brief, the research team successfully interviewed 11 transport operators and 6 local businesses from the provinces of Dong Thap, An Giang, and Can Tho. In addition, all Management units of industrial parks, Departments of Planning and Investment, and Department of Industry and Trade of the three provinces were interviewed. An additional interview with Dong Thap Department of Transport, which was out of the initial sample, was conducted to double check the information. Besides, qualitative information was also gathered from reports and media review to provide a comprehensive understanding of the Project's impacts

2.4.2 Research Tools

The endline qualitative interviews employed a set of interview guides tailored for each type of key informant. Those endline guides mostly followed the benchmark guides developed based on the 8 hypotheses. However, the guides were carefully revised to capture the impacts at endline. Specifically, the interview guides for transport operators, businesses, and industrial park management units were added questions to identify the changes of transport, operations, revenues, costs, and investments of local enterprises after the opening of the two bridges.

The research team composed the interview guides for the Departments of Planning and Investment and Departments of Industry and Commerce to obtain their viewpoints on the impacts of the Cao Lanh Bridge and the Connectivity Project to the investment and trade status of the surveyed provinces, as well as their expectations for future infrastructure investments.

2.5 Limitations

Despite its systematic design, this study has some limitations on fully measuring the impacts of the Cao Lanh and Vam Cong bridges. The biggest obstacle to the evaluation is the spread of COVID-19 pandemic in the Mekong Delta since early 2020. The pandemic led to numerous travel restrictions by the Government, which might reduce the traffic volumes in the region. COVID-19 also brought negative effects on the local households such as decrease of employment rate and household income. Moreover, the pandemic imposed constraints on the endline survey by preventing the collection of a comprehensive dataset (similar to the benchmark data) for analysis. Since a new wave of COVID-19 was attacking the Mekong Delta at the time of endline survey, the research team had to switch its plan from field survey to phone survey for all quantitative and qualitative components. The household questionnaire used for the quantitative survey was shortened to meet the time limit of the phone survey (maximum 30 minutes); thus, indicators like agriculture production and housing and living conditions of the households were not covered in endline. The attrition rate was also higher than the rate of a

field survey; 83% of the baseline households participated again in the endline survey, and 78% of the qualitative sample agreed to be interviewed. These factors limited the evaluation findings, and meant that some hypotheses could not be fully answered, which may lead to an underestimate of the Project's impact. Nevertheless, the research team maximized the use of the data to evaluate the Project, with the results being presented in the following sections.

3 Impact Evaluation Results

3.1 Households and Communes

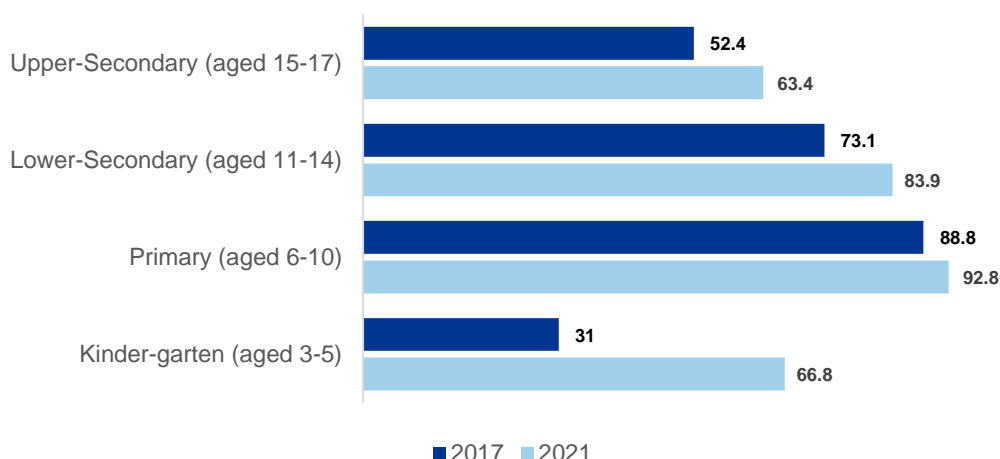
This section will present the socio-economic impacts of the Cao Lanh Bridge and the Connectivity Project on different aspects of the households, including access to public services and major facilities, employment status, household income and ownership of durable assets. In each part, descriptive analysis of the collected survey data will be followed by regression analysis results. This will help readers connect the observed change in patterns and the impacts of the Cao Lanh Bridge and the Connectivity Project.

3.1.1 Demography and Education

The demographic characteristics of the sample in three provinces understandably did not witness any significant change within the five years from the baseline to the endline survey. The number of households participated in the endline survey was 1,674. The average household size remains approximately 4 persons per household. Household heads are still predominantly male, with a slightly lower average age of 49.3. In terms of population composition by age group, while the proportion of the under 15 years old group slightly reduced, the proportion of the over working-age increased by 2 percentage points. Overall, the percentage of employed population is 78.4%, only marginally more than in the baseline by 1.8 percentage points.

Figure 2 presents the change in the net enrolment rates of children at different education levels between the baseline and endline surveys. Overall, **there is a clear increase in the rate of enrolment at all education levels, suggesting a general improvement in access to education in surveyed areas.** While the increase was marginal at the primary school level, the rates of enrolment at lower- secondary and upper-secondary levels improved significantly by 10.8 and 11 percentage points to reach 83.9% and 63.4% respectively. The kindergarten enrolment rate also rose from 31% in the baseline to 66.8% in endline survey.

Figure 2. Net enrolment rates at different education levels in 2017 and 2021 (unit: %)

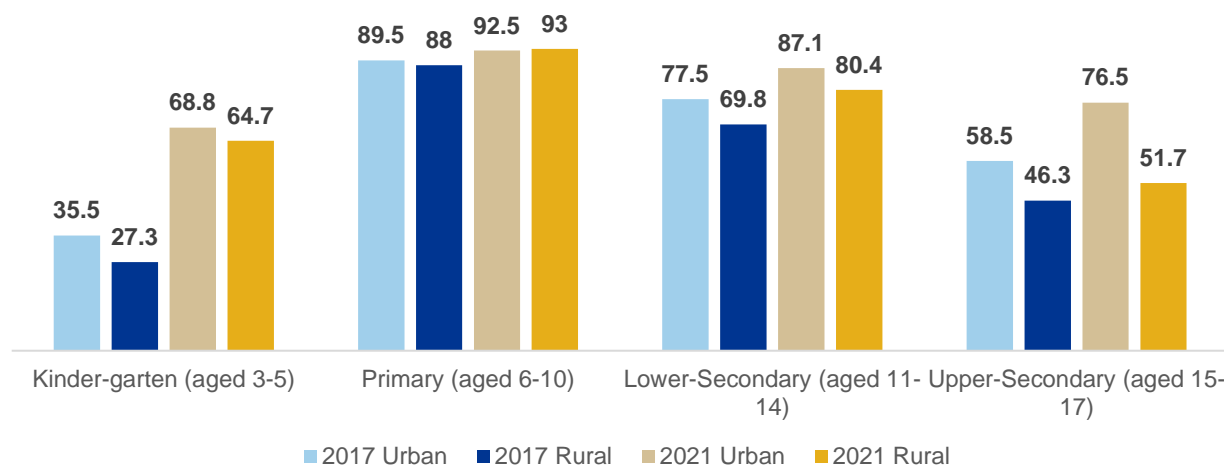


Source: Cao Lanh Impact Evaluation Household Surveys

In terms of gender difference, consistent with the trend found in the benchmark survey, **the enrolment rates were similar between boys and girls at the three lower education levels (Error! Reference source not found.)**. However, in both 2017 and 2021, at the upper secondary level, the enrolment rate of girls was about nine percentage points higher than that of boys.

Generally, as it was five years ago, **the percentage of children in the rural areas going to school at the right age was still lower than that of the urban areas at all levels of education, except for the primary school level.** Notably, the lower-secondary enrolment rates of urban and rural areas increased considerably by 9.6 and 10.6 percentage points from 2017 to 87.1% and 80.4%, respectively, in 2021. Similarly, the enrolment rates at the upper-secondary level of urban and rural areas both improved. However, while the upper secondary school age enrolment rate in rural areas increased by 5.4 percentage points, this rate in urban areas increased by 18 percentage points in the past five years.

Figure 3. Net enrolment rates of the urban versus rural areas at different education levels in 2017 and 2021 (%)



Source: Cao Lanh Impact Evaluation Household Survey

Infrastructure can have a positive effect on the education of children through two main channels. Firstly, better infrastructure can help households increase production and income, increasing spending on children's education. Secondly, better roads and bridges reduce transportation costs, which impacts the educational options of families. Although little evidence on the effect of access to bridges on education, several studies find positive effects of roads on education. Khandker et al. (2009) found that upgrading rural roads leads to more significant percentages of boys and girls enrolling in school in Bangladesh's rural areas. In Madagascar, Jacoby and Minten (2009) found that road investments had a beneficial impact on secondary school attendance. In Vietnam, Mu and van de Walle also find a positive effect of rural roads on children's enrolment.

Consequently, the Cao Lanh Bridge and the Connectivity Project's impact on the education of children is estimated in **Error! Reference source not found.** The interaction between the distance to the bridge and the time variable is our interested parameter, which is the estimate of the impact. A negative estimate of the interaction means children living far from the bridge have a lower probability of school enrolment than those living near the bridge after the bridge construction. It indicates a positive effect of the bridge on outcomes. The results show no significant effects of the distance to the nearest bridge on children's education, indicating a negligible effect of the bridge on education. The bridges connect highways, which might not be the main road to schools for children. It also suggests that current roads and bridges still afford children's traveling to schools.

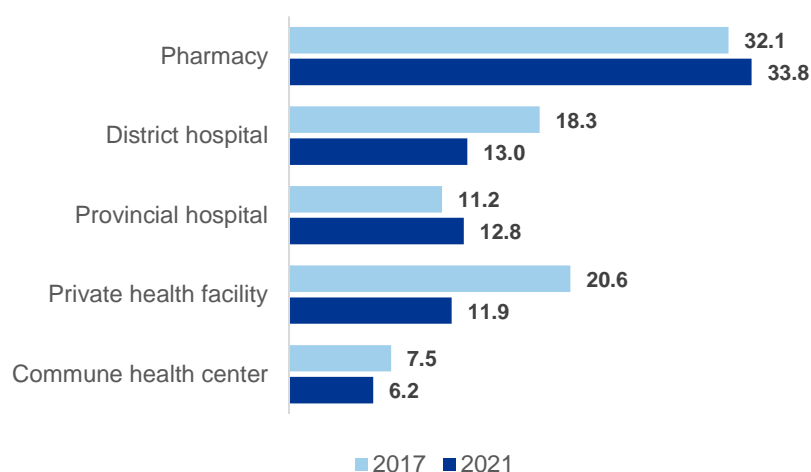
3.1.2 Healthcare

At the endline, **the proportion of residents having visited healthcare facilities in the last 12 months is 62.4%, a decrease of 7.4 percentage points from the baseline (69.8%).** However, the rate was much higher in the midline survey (79.2%). The outbreak of COVID-19 in Vietnam at the early 2020 might have altered residents' desire to visit healthcare facilities. Since the beginning of the pandemic, the Government of Vietnam advised healthcare facilities to implement precautionary measures against COVID-19. Accordingly, health facilities require visitors to book appointments, maintain a minimum distance of 2 metres within the closed space and limit their capacity at the facilities. These together with the fear of being infected at the facilities could have made residents defer visits where possible. The declining trend is evident in all sub-groups, regardless of their

demographic characteristics. Notably, compared with their counterparts, the more marginalised residents, such as female, the poor or those living in rural areas were more likely to reduce the medical visits.

Pharmacy, hospital at district and provincial levels, private health facility, and commune health centre remain the most prevalent healthcare facilities for residents in all sub-groups (Figure 4). However, the prevalence of these medical facilities varied between the two surveys. In 2021, pharmacy was still the most frequently visited healthcare facility. The proportion of residents having visited pharmacies in the last 12 months increased from 32.1% to 33.8% despite the general trend of residents’ reduction on medical visits, as mentioned earlier. The greater prevalence of pharmacies could be explained by the fact that, compared with other facilities, they are often located within a shorter distance and have a lower risk of spreading COVID-19. On the contrary, endline data presents a lower likelihood of the residents’ visits to private healthcare facilities when the corresponding figure decreased by 8.7 percentage points. The households’ income reduction (mentioned in 3.1.4) might have a causal relationship with fewer medical visits made by the residents. Also, they could have deferred visiting these facilities due to the fear that the private facilities were more likely to have lower compliance with safety protocols against COVID-19 than their public counterparts. In reality, some private health facilities in Vietnam were suspended due to their failure in screening and detecting COVID-19 patients⁶.

Figure 4. Top 5 healthcare facilities that were most frequently visited by the residents (%)



Source: Cao Lanh Impact Evaluation Household Surveys

Though simple before-and-after comparison (via descriptive data) could not reveal any considerable improvement in residents’ access to healthcare facilities, regression results in suggest that **the Cao Lanh Bridge and the Connectivity Project has positively impacted residents’ access to the central hospitals**. Specifically, residents living far from the Bridges were less likely to use the services of these medical facilities. Accordingly, if the distance doubles, the probability of residents’ visiting the central hospitals decreases by 0.7 percentage points.

3.1.3 Access to Facilities

The Cao Lanh Bridge and the Connectivity Project’s primary hypothesis assumes that the CLBP will bring about accessibility and mobility improvements for the residents in the project area. The hypothesis could be partly evidenced by changes in households’ access to major facilities. As shown in Table 16, **there is a considerable reduction in the travel distance of the households to all facilities**. Nevertheless, **the corresponding time that the households spent on travelling to those destinations saw no change from the baseline survey**. Thus, further investigation, via regression model, is necessary to cross-check the Project’s impacts on the two variables – households’ travel distance and time.

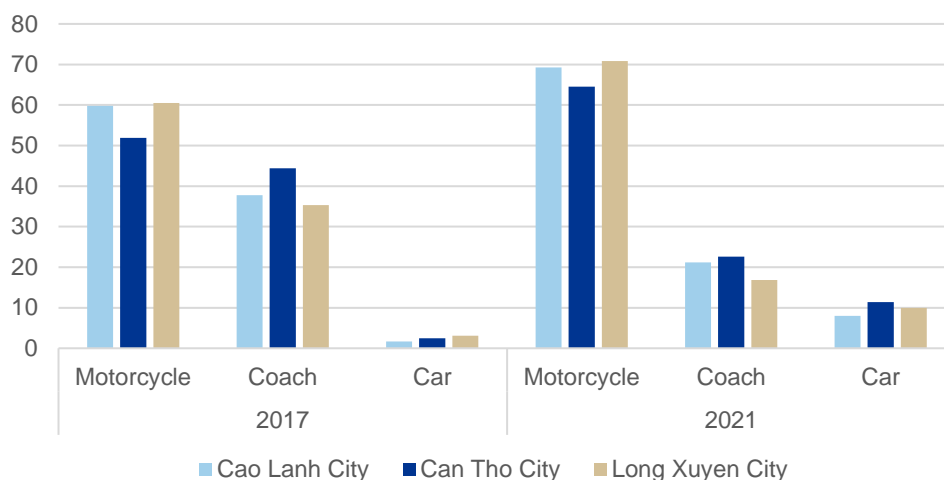
⁶ Please read further at: <https://ncov.moh.gov.vn/en/-/6847426-2307>

Table 17 presents results of the Ordinary Least Squares (OLS) regressions of these two variables on distance from households' homes to the nearest bridge. Based on the results, **the Cao Lanh Bridge and the Connectivity Project is found to have a positive impact on households' travel distance to wholesale markets** for people whom live far from the bridge, and have to travel longer distances to reach the facilities. **The Project also helps to reduce households' travel time to Cao Lanh City and Long Xuyen City.** To be specific, compared with their counterparts, people residing nearby the bridge could travel to those cities more quickly. These accessibility improvements might be an essential factor stimulating households' visits to those three destinations. The proportion of households having travelled to wholesale markets, Long Xuyen City, and Cao Lanh City increase at endline to reach 21.8%, 48.6%, and 48%, respectively.

Concerning households' means of transportation, similar to the baseline result, motorcycle is the most common vehicle used by the households for travelling to all facilities. However, in 2021, there is a transition in households' transport mode for travelling to locations farther away, such as Cao Lanh City, Can Tho City, and Long Xuyen City. As shown in Figure 5, the surveyed households replaced coach trips by using bike and car transport when travelling to those cities. Indeed, the percentage of households travelling to the three cities by coach had increased remarkably in the midline survey, before the outbreak of COVID-19 in 2020. People may have preferred private transportation versus public, due to the concern about coronavirus transmission in the enclosed space on the coach⁷.

⁷ Luo et al. (2020) found potential airborne transmission of SARS-CoV-2 and virus super spreading events in close contact and closed space settings on public transportation.

Figure 5. Common means of transportation that the surveyed households used to reach the principal cities in the project area (%)



Source: Cao Lanh Impact Evaluation Household Surveys

Notably, endline data reports a modest increase in the proportion of households using ferries as their most common mean of transport to reach the facilities. This outcome should be interpreted carefully. Typically, the vehicles most commonly used by the households were recorded. However, if a household needs to combine different modes of transport for travelling, the enumerators were instructed to record the transport mode that took up most of the total traveling time. For instance, households that had to travel by both motorcycle and ferry to a district hospital, and if the time spent on the ferry was longer than that on the motorcycle, meant that the ferry would be captured as the means of transportation used. Indeed, the closure of Vam Cong and Cao Lanh ferries⁸ might have forced households in some areas⁹ to switch to private ferries. Compared with the old Vam Cong and Cao Lanh ferries, these ferries are often smaller and operate with fewer trips per day. Therefore, households had to spend more time waiting for a trip. This increased households’ total time spent travelling by this mode of transport, and made it easily become their primary vehicle.

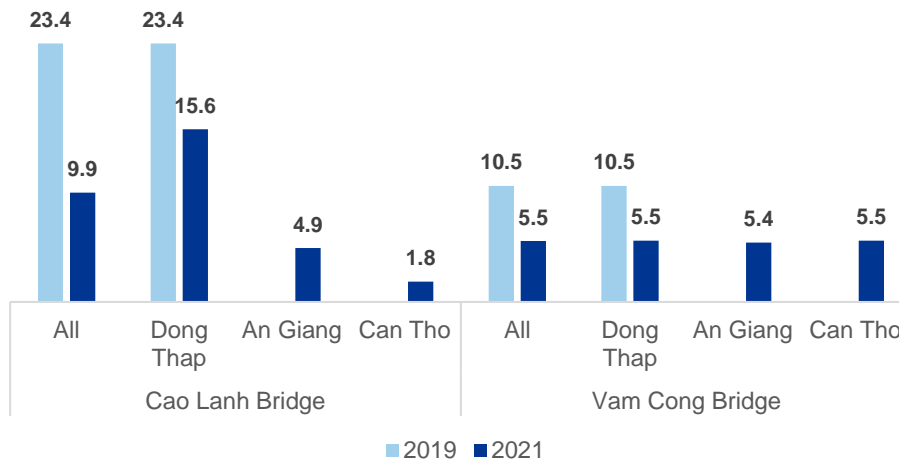
In regards to bridge usage, **in 2021, there is a remarkable decline in the proportion of households crossing the Cao Lanh and Vam Cong Bridges.** The pattern could be explained by two main reasons. First, households might have tended to travel less in 2020 and 2021 due to COVID-19 impacts¹⁰. Second, the midline figure might have been overestimated because the sample of the midline survey only consisted of the households in Dong Thap. Figure 6 shows that Dong Thap residents benefit the most from the Project as the proportion of households reported to have crossed the Cao Lanh Bridge in the past 30 days is much higher in Dong Thap than in the other two provinces. Around 15.6% of the households surveyed in Dong Thap claimed they had crossed the Cao Lanh Bridge in the last 30 days, while the corresponding figures were only 4.9% and 1.8% for those living in An Giang and Can Tho.

⁸ The Vam Cong and Cao Lanh ferries were closed on June 30th, 2019 and August 24th, 2020. However, due to the demand of the residents, especially the bicycle and motorcycle users, two small ferries had been operated near the locations of the old Cao Lanh ferry ports to transport motorcycles through the rivers since October 2020. These ferries, then, were temporarily stopped on July 9th, 2021 to prevent COVID-19 spread in the Mekong Delta.

⁹ The long connecting roads with a limited number of exits makes it quite challenging for households in some areas to use the bridges. Travel by ferries are more preferred by those households. That is why small ferries are still operated though the bridges have been inaugurated since 2019.

¹⁰ Please refer to the BCA analysis for further information.

Figure 6. Proportion of households having crossed the Cao Lanh and/or the Vam Cong Bridge in the last 30 days (%)



Source: Cao Lanh Impact Evaluation Household Surveys

When asked about the trip purpose for crossing the Cao Lanh Bridge in the past 30 days, most households cited “Going to work” (32.7%) and “Visiting relatives/friends” (24.2%) as their primary purposes (Error! Reference source not found.). This pattern is also found for those crossing the Vam Cong Bridge when corresponding figures are 35.9% and 17.4%, respectively. The proportion of households crossing either the Cao Lanh or Vam Cong Bridges to purchase household utensils/production materials is higher at the endline. This finding is aligned with the expectation that the project will help to boost trading activities in the region. Finally, trip purposes relating to schooling and healthcare visits are still rare, as educational and medical facilities are generally located within a shorter distances.

3.1.4 Employment and Household Income

Employment

Within this endline report, the labour force refers to all the females aged from 15 to 55 and males aged from 15 to 60 and they are regarded as working if they are either employed or self-employed in the last 12 months. **Over the course of five years (2017-2021), the general working rate for the three provinces increased by 2.2 percentage points and stands at 79.6%.** This is a positive sign of economic growth amidst the COVID-19 pandemic as job insecurity, layoffs, and underemployment have been rampant in Vietnam at the beginning of 2020¹¹. An Giang witnessed the most significant rise (3.7 percentage points) whilst there was a modest increase in the working rate of Dong Thap and Can Tho (1.7 percentage points). Overall, the working rates by gender and area of An Giang in 2021 remained slightly lower compared to the other two provinces. Even though there was a big jump of 5.5 percentage points in the employment rate of rural and female residents in An Giang, they were still 2 and 2.5 percentage points lower than those of Dong Thap. Similar to 2017, the percentage of labour force participants in Can Tho continued to be the highest across the sub-groups of the three surveyed locations, except male workers.

There appeared substantial gains in the percentage of working people amongst those aged under 30 years old and in the highest income quintile. Of these two sub-groups, 5.1% and 7.1% more of those at the working age recently participated in the workforce, respectively. By gender, female participants accounted for 71.3% of their working age population, whereas male workers made up 86.8% in 2021. This difference reflects the gender inequality which has long been prevalent in the labour market in Vietnam. Domestic chores were cited as the reason for lack of participation in the labour force by 47.5% of females, but only by 18.9% of males¹². In addition, income disparity (estimated at 13.7% based on monthly salaries in 2019) might also discourage

¹¹ <https://www.gso.gov.vn/en/data-and-statistics/2021/01/COVID-19-impacts-on-labour-and-employment-situation-in-quarter-iv-of-2020/>

¹² https://www.ilo.org/hanoi/Informationresources/Publicinformation/Pressreleases/WCMS_774577/lang--vi/index.htm

females from securing a job¹³. Although the percentage of female workers is still lower than that of their counterparts, more females recently became active in the workforce than males (2.7% and 1.3%, respectively). Without COVID-19, the increase in the female's employment rate might have been more significant as women's job security was found to be particularly prone to the impacts of the pandemic¹⁴. COVID-19 induced underemployment and job loss, especially amongst females has undermined the impacts of the CLBP. Travelling time-savings on trips to provincial and central cities thanks to the two bridges might be a driver of women joining in the workforce, especially in manufacturing and services. Over 30% of survey respondents commuted to work via the Cao Lanh Bridge and the Vam Cong Bridge. However, the pandemic hit manufacturing and service sectors the most¹⁵ and reduced females' demand for travelling via the bridges.

Improved infrastructure is said to increase employment opportunities (Berg et al., 2015). We estimated the effect of the distance to the bridge on different indicators of employments of people aged from 15. We found a **positive effect of the Cao Lanh Bridge and Connectivity Project on the working status of the population**. If the distance to the nearest bridge increases by 10% of the mean distance (equivalent to 2.5 km), the probability of working decreases by 0.5%.

By sector, the overall employment rate has not seen significant changes since the benchmark survey. Paid jobs continued to be taken by nearly 60% of the working age people while agriculture and non-agriculture self-employment was equally participated in by over 30% of this group in 2021. Despite a decrease, approximately two thirds of the poor and three-fourths of those aged under 30, and those completing upper-secondary education level were employed. 10.8% more of the highest income sub-group were engaged in wage jobs in 2021. However, with the uncertainty caused by COVID-19, self-employment in the agriculture, forestry, and fishery sector might be more secure, than a paid job in services, industry and construction sectors¹⁶.

There was a tendency that many at the lowest age group and those with higher education level or belonging to higher income household quintiles switched to or did agricultural production as additional employment. The rates of lower-secondary degree holders, upper-secondary education attainers, and under-30-year-old workers that earned their living as agricultural producers increased by 7.4%, 5.6%, and 6.1%, respectively. In addition, roughly 4% more of female and urban workers got involved in agricultural activities for income. Being dismissed or hired seasonally might force women to rely more on agricultural business. Paddy fields and farms are mostly nearby their households, hence demand for using the bridges is lower. In fact, the total number of female travellers through the bridges reduced by 16% in 2020 compared to 2017 (further found in the BCA part). The increase of participants in the agriculture sector and better infrastructure system since the inauguration of the CLBP suggest investments in agricultural production, particularly large-scale and high-tech farming in the studied provinces and city. While there was a general decline in the obtainment of non-agriculture employment across all the sub-groups, 4.6% more of those under 30 participated in this sector. Fewer working-age people of the non-poor households and (near) highest income sub-groups lived on non-agricultural production, whereas their counterparts were more likely to depend on this source of income.

Reduced transportation costs may result in a shift in production and labour away from agriculture. According to Chandra and Thompson (2000), lowering transportation costs results in a shift of labour from agriculture to manufacturing in the United States. Similarly, Gertler et al. (2014) find that increased road quality in Indonesia leads to an increase in manufacturing job growth and a shift in workers' occupations from agricultural to manufacturing. In the case of Vietnam, Van de Walle (2009) discovered that when a new road is built in Vietnam, it is followed by the introduction of new non-farm activities **Error! Reference source not found.** confirms findings from van de Walle (2009). **People living close to the bridge have a higher proportion of wages earned from employment and non-farm work.** If the distance to the bridge increases by 10%, the probability of having a wage job and a non-farm work decreases by 0.26% and 0.17%, respectively. Regression results

¹³ https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---ilo-hanoi/documents/publication/wcms_774433.pdf

¹⁴ https://www.ilo.org/hanoi/Informationresources/Publicinformation/Pressreleases/WCMS_774577/lang--vi/index.htm

¹⁵ <https://www.gso.gov.vn/du-lieu-va-so-lieu-thong-ke/2021/01/bao-cao-tac-dong-cua-dich-covid-19-den-tinh-hinh-lao-dong-viec-lam-quy-iv-va-nam-2020/>

¹⁶ In 2020, 26.4% of workers in the agriculture, forestry and fishery sector was affected by COVID-19, whereas the rate was 71.6% for the service sector and 64.7% for the industry and construction sector. Please refer to: <https://www.gso.gov.vn/en/data-and-statistics/2021/01/covid-19-impacts-on-labour-and-employment-situation-in-quarter-iv-of-2020/>

reveal that access to the bridges increases the per capita wage substantially. The elasticity of the per capita wage to the distance to the bridge is estimated at -0.295. Interestingly, people living close to the bridge also have a higher probability of having farm work. These findings confirm Hypothesis 3.

Agriculture income

To eliminate the effect of the inflation factor, agricultural revenue and average household income in 2017 and 2021 are calculated at fixed prices in 2010 according to circular No. 02/2012/TT-BKHĐT¹⁷ dated 4 April 2012 by the Ministry of Planning and Investment. Agriculture income is composed of the revenues from crops, livestock, forestry, and fishery products. As the 2017 survey was conducted in March and the 2021 one was in June, normally the harvest time, agricultural income was seasonally adjusted.

On average, annual household income from agricultural products dipped from VND 12 million in 2017 to VND 7.6 million in 2021. The design of the endline survey could partly explain this decline. Due to COVID-19, face-to-face survey data collection had to be done via telephone and the questionnaire had to be adapted accordingly. A major trunk of agricultural land and production in the baseline questionnaire that enquired about the output, its value, and cost of production of each crop, livestock, aquaculture product, and farming service was shortened to a few items in the endline survey. Hence, agriculture income in 2021 might not have been fully estimated as it was in 2017. In addition, COVID-19 had direct and negative impacts on the transportation and consumption of agricultural products domestically and internationally and consequently on their sold quantity and values¹⁸. That farmers' hardship is visible while the pandemic is expected to endure requires immediate actions and long-term plans of the local governments.

Among the three surveyed provinces and city, An Giang recorded the sharpest fall of VND 9.7 million. Loss in earnings from agricultural production reported by rural and male-headed households was 3 times as much as that of their counterparts. In 2021, their average agricultural income was VND 10.8 million and 9.7 million, respectively. Amongst the education sub-groups, the agricultural income of the households whose heads completed primary education decreased the most over the last five years (VND 8.5 million). It is observed that the older the age of household heads, the less the households earned from farming, fishery, and forestry. While there was a decreasing trend in the agricultural revenues of most surveyed households, those headed by persons under 30-year-old gained VND 2.7 million since 2017. However, their earnings from agricultural products were still lower than the other aged sub-groups. Regarding financial status, the households belonging to the higher income quintile had a higher tendency to make less from agricultural production. In 2021, the highest income families earned just half of their 2017 agricultural revenue, VND 20.5 million.

Regarding the agricultural income structure, despite a drop of 6.1 percentage points, crop cultivation continued to be the chief source of surveyed households' agricultural income in 2021 (83.2%). On the contrary, over the 2017-2021 period, the revenue of raising livestock increased by 6.1% and accounted for 10.6% of the total agricultural income. Relatively equal and large changes occurred in the proportions of crop and livestock growing income earned by the households headed by lower-secondary education obtainers or aged 30 to under 45. For instance, while crop harvesting could contribute a smaller fraction of 24.5% to the total agricultural income, trading livestock and their products took up a larger portion (23.7%, equivalent to VND 3 million). The proportions of fishery and forestry income did not change much over time and remained negligible (6.2% and 0.1%, respectively). By province, although the actual profits of crop growing of the households in An Giang decreased the most compared to Dong Thap and Can Tho, crop revenue became a more important agricultural income source for them (7.8%).

¹⁷ <https://thuvienphapluat.vn/van-ban/Linh-vuc-khac/Thong-tu-02-2012-TT-BKHDT-nam-2010-lam-nam-goc-thay-cho-nam-goc-1994-137660.aspx>

¹⁸ <https://nld.com.vn/kinh-te/tim-dau-ra-cho-nong-san-20210726214722046.htm>

Individual and household income

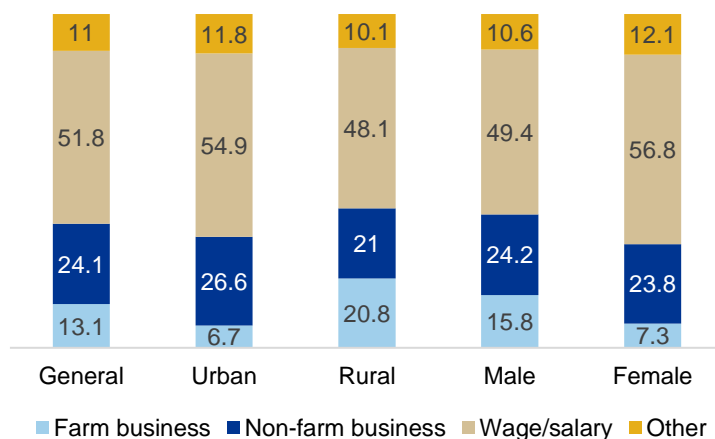
The per capita average income of the residents in Dong Thap, An Giang, and Can Tho was VND 14.6 million in 2021, 16.2% lower than that in 2017. A decline in earnings was foreseen as COVID-19 affected all sources of income except the pandemic resistant ones like pension, unemployment benefits, and so on. Wage reduction might result from job loss or underemployment, agriculture income suffered from farming products' selling at lower prices and quantity, and other sources (property renting, savings interest, dividends, etc.) were also affected. Over 67% of the respondents themselves perceived the negative impacts of COVID-19 on their earnings and nearly 30% felt a decrease of 50% or more.

The people in An Giang made 74.8%, and those in Dong Thap earned 87.9% of their 2017 income. The declining trend was dominant across all the sub-groups, except the household heads aged under-30-year-old in Can Tho. In 2021, their income rose by 60.6% and became the highest amongst the aged sub-groups while it was the smallest in 2017. On the contrary, earnings of this sub-group dropped the most in Dong Thap and An Giang provinces, 29.5% and 41.5%, respectively. By education level, the per capita income of the households headed by primary degree holders faced the sharpest plunge of 25.9%, equivalent to VND 4.6 million. There was a slight decline (13%) in the annual income of those in the households with this demographic character in Dong Thap while that of the similarly characterised resident group in An Giang and Can Tho dropped by 43.3% and 31%, respectively. Regarding location and gender, similar to the baseline findings, urban residents earned more than rural counterparts and males generated more income than females.

Four components of household income are farm business, non-farm business, wage, and others. **Compared to 2017, households generally made less money from all activities, but their wage increased by VND 3.5 million.** The biggest reduction was in farming revenues (VND 5.5 million). By education level, the income of the households headed by primary education achievers decreased by VND 8.9 million. While the other aged groups earned less from agriculture, fishery, forestry, those aged under 30 gained VND 2.6 million. However, the farming income of the 45-to-60-year-old sub-group remained the highest among them. There emerged a prevailing trend that the higher income sub-groups had the propensity to lose agriculture income more, but their earnings from this production activity continued to be much higher than their comparable sub-groups. To illustrate, although declining by VND 22.5 million, farm business could contribute VND 20.5 million to the total income of the highest income households, 6 times as much as earnings of the near lowest income quintile. It is noticeable that paid salaries of the non-poor and higher income families went up while their counterparts were inclined to be paid less. The non-poor households earned VND 31.3 million on average in 2021, VND 3.7 million more than in 2017, whereas the poor ones' waged income slightly declined by VND 0.5 million. Similar to 2017, the households in An Giang generated the least income amongst the three studied areas in 2021 (VND 47.8 million). It was VND 12.5 million and 17.5 million less than the income of the households in Dong Thap and Can Tho, respectively.

Wages constituted a greater proportion of household income than in 2017 (51.8% vs. 38.9%). At the same time, income derived from farming, non-farm businesses, and other sources became less important compared to 5 years ago. Indifferent from 2017, monthly salaries continued to hold a more important role in the income structure of urban and female-headed households than their counterparts; however, the differences between them, and comparable sub-groups lessened. The baseline findings revealed 14% and 11% gaps among the location and gender-based sub-groups, but they were shortened to 6.8% and 7.4% in 2021. On the other hand, farming activities, formed a minor part of the total income of urban and female-headed households, but held a much more crucial role in the average annual earnings of rural and male-headed ones. By age, the income of the households whose heads were aged under 30 witnessed the biggest changes. 21.5% more of it was contributed by wages while the proportion of non-farm business income decreased by 19.1%. This was a general tendency amongst the income and poor status based sub-groups. The better the household income was, the more likely they became dependent on regular payments and less likely to rely on agricultural revenues. To demonstrate, in 2021, the highest income quintile saw wages contribute 18.5% more to total income, whilst farm business income reduced by 10.5% compared to 2017

Figure 7. Household income structure in 2021 by province and gender (%)



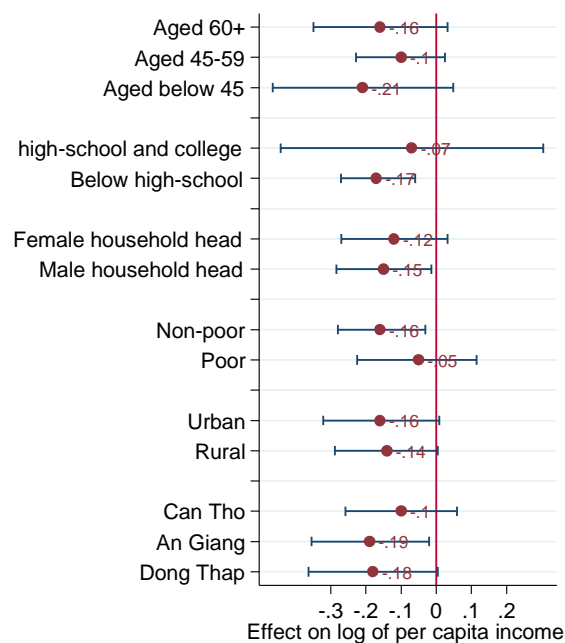
Source: Cao Lanh Impact Evaluation Household Surveys

There is a wide consensus that better infrastructure can increase household income. Rural roads, according to Jalan and Ravallion (2001), are a vital component for rural income growth and poverty reduction. Lower transportation costs boost remote household income in Madagascar, according to Jacoby and Minten (2009). Emran and Hou (2013) find that increased access to domestic and international markets boosts per capita consumption and improves impoverished people's livelihoods in rural China. Khandker et al. (2009) discover that rural road investments reduce poverty by increasing agricultural productivity, raising wages, lowering input costs, and raising output prices in Bangladesh. Recent empirical studies on the positive effects of rural roads on household income and poverty reduction can be found in Hine et al. (2019).

In our study, we expect that the positive effect of the bridges on employment will be translated into a positive effect on household income. **Error! Reference source not found.** presents the estimates of the distance to the nearest project on the per capita income of households. A negative estimate of the interaction means households living far from the bridge have lower per capita income, meaning a positive effect of the bridges on income. We adjust the 2017 income to the 2021 price using CPI. Column 1 indicates **a positive effect of the bridge on per capita income**. If the distance to the bridge increases by 10%, the per capita income of households decreases by 1.4%, equivalent to VND 360 thousand. **Among different income sources, there are positive effects of the bridge on wage and non-farm income.** A ten-percent decrease in the distance to the bridge increases per capita non-farm income and per capita wage income by 7.7% and 4.1%, respectively. We see a reducing effect of the bridges on the public transfers. Possibly, the bridges help raise household income and reduce their poverty, and as a result, some households who escaped from poverty do not need to receive supports from the government.

We then explore the heterogeneous effect of the bridges on different population subgroups runs regression of log of per capita income on distance to the nearest bridge for different population subgroups. All the estimates are negative, suggesting the positive effect of the bridge on per capita income for all the sub-groups. However, due to the small number of observations in the subgroups, most estimates are not statistically significant. Overall, **the differences in the effect of the bridges on different population subgroups are not statistically significant at the conventional levels.**

Figure 8. Heterogeneous effect of the Cao Lanh Bridge and the Connectivity Project on log of per capita income



Source: The research team's estimation using results of Cao Lanh Impact Evaluation Household Surveys

Within the endline survey, households' perception of their income change since the baseline study was collected through the question of "How has your household income changed since 2017?". **The household income indicator suggests that the economic picture of the three studied areas in the last five years (2017-2021) was not completely optimistic.** While roughly half of the households were not aware of any changes, 21.3% and 30.2% perceived an increase and decrease, respectively. Particularly, 9.7% of the surveyed households estimated their income loss at 50% or more compared to 2017. Among the three survey provinces and city, the economy of An Giang seemed to slow down the most with 37.1% of its households suffering from a decline in their earnings over the last 5 years. That percentage was 8.6% and 10.5% larger than that among those located in Dong Thap and Can Tho, respectively. The table below also shows that the likelihood of positive changes reported by the households headed by more highly educated persons and with better income was higher than their comparable sub-groups. For instance, while greater than 30% of the households with no degrees or primary education level acknowledged a decline in their income, just over 20% of those educated to secondary level felt it. Similarly, 40.5% of the lowest income quintile lost their earnings but only 13.9% of the top quintile did. Added to that, roughly 20% of the former reported an income reduction of 50% or over, whereas merely 1.5% of the latter did. The endline survey findings are consistent with the World Bank's survey themed "Monitoring COVID-19 impact on households in Vietnam" in January 2021¹⁹.

COVID-19 impact on household income

To capture the impact of COVID-19 on household income, the endline survey included a question of "How has COVID-19 affected your household income?". **The response to this question was largely divided amongst the households in the surveyed areas. 62.7% of them reported a decrease, while 36.7% did not notice any changes.** Although the earnings of the households in An Giang were most vulnerable to negative changes over time, they were least likely to be affected by Covid-19. The fraction of the sufferers from Covid-19 impact in this province was 57.6%, which was 7.3% and 5.6% smaller than that in Dong Thap and Can Tho, respectively. The location and gender-based sub-groups were equally affected by the pandemic. Nevertheless, there existed a correlation between the Covid-19 impact and household heads' age and household income levels. The oldest aged sub-group felt the negative impact the least (55.5%). This can be explained by the fact that they tend to live on the regular and fixed income sources including wages and other sources such as pension, social support, and savings interests (65.3%). In terms of income-based categories,

¹⁹ Please read further at: <http://news.chinhphu.vn/Home/WB-Survey-Average-Household-Income-Decreases-By-1122-Due-To-COVID19/20214/43419.vgp>

while 27.4% of the lowest income quintile acknowledged that Covid-19 was the cause of a 50% or more decrease in their annual revenues, only 10.9% of the top quintile did. The percentage of this group decreased when the household income increased.

COVID-19 has severely and directly affected almost all sources of household income (as explained above) and undermined the socio-economic impacts of the Cao Lanh Bridge and the Connectivity Project. As the majority of the surveyed respondents undertake paid employment, until the provincial and national economies return to their pre-pandemic levels, governments' measures to support employment providers' taking precautions, normalizing their operation, and provision of financial packages or waive/reduce some taxes are needed. Besides the convenience of the current transportation system, Dong Thap, An Giang, and Can Tho have had over 200 One Commune One Product (OCOP) products²⁰ registered. Taking advantage of these, investment in factories processing agricultural products for exports might offer more employment opportunities to the local people and consequently improve their income and social welfare.

3.1.5 Household Assets

Durable assets owned by the surveyed households were categorised according to their main usages into transportation means, production facilities, and household appliances. **Since the baseline survey, motorbikes, colour TVs, and refrigerators have been the topmost owned assets.** Of the three asset groups, household appliances, especially refrigerators and washing machines, won the greatest popularity over the last five years (18.4% and 19.8%, respectively). On the contrary, within this group, the possession of colour TVs declined by 5.1 percentage points, but still stood at 90.9%. The drop could be rationalized by the increasing access to the Internet/wifi, affordable prices, and the striking features of smartphones and desktops. Experiencing a moderate decline was the proportion of pumping machine owners (6%) although the percentage of the working-age people participating in agricultural production slightly increased during the 2017-2021 period. This is accompanied by stable ownership of electric generators. Improved access to the national power grid and irrigation systems in cultivation areas could be possible causes. Automobiles and motorbikes, means of transport for mobility and accessibility to market, increased to be slightly more common. The biggest increase in the ownership of motorbikes was recorded amongst the households based in Can Tho (6.3%).

Regression analysis results for the effect of the bridge on households' appliances presented. The bridges do not have significant effects on household's appliances. This suggests that **the income gained from the Cao Lanh Bridge and the Connectivity Project is not translated into purchase of appliances.**

3.2 Businesses

This section presents findings from the qualitative study as outlined in the Design of Cao Lanh Impact Evaluation. Three groups of informants were consulted, including (i) Transport operators; (ii) Enterprises in the industrial parks; and (iii) Economic Zone Authorities, Departments of Planning and Investment, and Department of Industry and Trade, to obtain insights into the range of development impacts generated by the Cao Lanh Bridge and the Connectivity Project. In each part, findings are presented according to relevant hypotheses.

3.2.1 Transport Operators

The research team conducted interviews with 11 transport operators across the three provinces. Their operation varies in terms of the type of activity, scale, and location, which allows a solid understanding of the impact of Cao Lanh Bridge on the transport sector. The findings from the interviews confirm the formulated hypotheses.

Hypothesis 1: The CLBP investment will generate accessibility and mobility improvements, leading to wider socio-economic development benefits within and among the three provinces

²⁰ <https://nongnghiep.vn/dong-thap-co-tren-161-san-pham-ocop-d284966.html>

<https://nongnghiep.vn/an-giang-co-42-san-pham-ocop-dat-tu-3-sao-tro-len-d286248.html>

<https://vov.vn/kinh-te/can-tho-co-them-san-pham-dat-chat-luong-ocop-cap-thanh-pho-866919.vov>

Accessibility refers to people's and businesses' ease of reaching desired goods, services, and activities, while mobility can be understood as the ability and level of ease of moving goods and services. The operators acknowledged that the improvements in accessibility and mobility result from shorter travel time and lower travel costs.

Improvement of accessibility and mobility between the North and the South of Tien River

Travel time reduction is the most frequently mentioned phrase by the transport operator representatives. In the past, people used to travel between the North and the South banks of the Tien River, either by Cao Lanh ferry or by means of road transport via the My Thuan bridge. Travelling by Cao Lanh ferry was often time-consuming as buses and trucks had to queue for up to one or two hours. Due to the weight limit of 16 tons to vehicles aboard the ferry, many drivers reluctantly had to travel over the My Thuan Bridge instead of taking a shortcut with the Cao Lanh Ferry. In these cases, the distance was doubled and thus caused prolonged travel time. Now, the Cao Lanh Bridge has shortened the travel time from one side to the other side of the river to 15 minutes, said Sa Dec Transport Cooperative representative.

In the Mekong River Delta, the network of rivers and canals acts as an important inland and offers the regional people with livelihood sources. On the other hand, it separates the region and making many areas inaccessible if there exist no ferry services or bridges across rivers and canals.

Dong Thap is a typical example. The North of the Tien River are Hong Ngu Town (a part of the two districts Hong Ngu and Thanh Binh); the districts of Tan Hong, Tam Nong, Cao Lanh; and Cao Lanh City. Located in the South are a part of Hong Ngu and Thanh Binh districts; the districts of Lap Vo, Lai Vung, Chau Thanh; and Sa Dec City. There are two major routes to travel between the North and the South. The first is to cross the river via the Cao Lanh ferry and, the second is to travel over the My Thuan Bridge and turn back toward the Cao Lanh direction via NR30. Taking the first route to travel between Sa Dec and Cao Lanh cities, the two main business centres of Dong Thap province, could save 35-40 km compared to the second route; however, travel duration remains the same as time waiting for the ferry is more or less equal to the time for travelling a longer distance.

The representative of Mai Linh Group's Dong Thap branch said, *"The impact of the Cao Lanh Bridge on transport companies is very positive. In the past, we could not serve the passengers who wanted to travel from the other side of the Tien River to Cao Lanh City as we could only pick them up after they took the ferry to this side of the river. Since Cao Lanh Bridge came into operation, Mai Linh taxi drivers can come to collect their passengers at their homes."*

She also said, *"Without the Cao Lanh Bridge going from Cao Lanh city center to Lap Vo district, the total time to travel and wait for the ferry is about 5 hours. Now used the Cao Lanh Bridge, the travel time is shortened by half."*

Box 1. Case study: Reduced travel time between the North and the South bank of Tien River

In addition, **another important implication of the Cao Lanh Bridge is the improved accuracy of travel time estimation.** For freight transport operators, who gain customer satisfaction and loyalty mainly with on-time delivery, it directly affects them as the explicit and implicit costs of late delivery can be substantial. Before the bridge inauguration, there were severe traffic congestions in rush hours and also at some other unpredictable points of time during the day. Hence, despite scheduling passenger transport and freight shipping out of rush hours, transport operators found it hard to estimate travel time and minimize delays in pickup and delivery services. Long queues of passengers and vehicles waiting to board the ferry have disappeared thanks to the Cao Lanh Bridge.

Another impact of the Cao Lanh Bridge is lower transport costs, especially for transport operators on the North-South bank of the Tien River route. Total cost reduction directly results from shortened distance and travel time and indirectly from a better estimation of pickup and delivery time. Transport operators have been able to save on overheads costs such as driver wages per trip, ferry tolls, fuel costs, vehicle maintenance

"The costs of worn-out vehicles and fuel consumption decrease due to clear roads. Besides, by shortening the travel time, we can now reduce the travel cost per trip."

IDI with the representative of Thap Muoi Transport Cooperative, Thap Muoi, Dong Thap

"In case of urgency, we have to pay for the ferry operators or middle-man at the ferry so that we can go faster. We might have to pay about 300 to 500 thousand dong, depending on the situation, as we do not want to pay for the fine due to late delivery. Late delivery also harms our reputation. When Cao Lanh Bridge came into operation, we don't have to pay that fee, which is a relief for us."

IDI with the representative of Sa Dec Transport Cooperative, Sa Dec, Dong Thap

costs, and intermediaries' costs paid to ferry operators to avoid late delivery²¹.

Improvement of accessibility and mobility to other provinces

Overall, transport operators of all the three provinces agreed that the CLBP has led to significant improvements in their accessibility and mobility to other provinces. In the past, traffic congestion was severe at the Cao Lanh Ferry and even much worse at the Vam Cong Ferry. Lining up waiting to board the ferries was a waste of time and reduced flexibility in trip scheduling activity. Passenger and freight transport over the Cao Lanh and Vam Cong bridges now helps **save boarding waiting time**. *"Now, the travel time is greatly shortened. In the past, the Kien Giang – Ho Chi Minh City trip often last 7-8 hours and up to 10 hours if there were tailbacks waiting for boarding the ferry. Now, with the Cao Lanh and Vam Cong Bridges, its duration is shortened to 4.5 to 5 hours."* - said Vu Linh Transport Company (Cai Rang, Can Tho) representative.

Most transport operators claim that their operating costs are lessened thanks to the Cao Lanh Bridge and the Connectivity Project. This was exactly what the operators on the North-South route shared. The findings are most evident among freight transport operators who own heavy trucks for freight transportation. *"Without Cao Lanh and Vam Cong Bridges, we could take two routes from Can Tho to Dong Thap. One was to take Cao Lanh and Vam Cong ferries and another was to travel a 50-km long distance. Our heavy trucks would not be safe to board the ferry, thus we were forced to take the second route. The inauguration of the two bridges shortens our travel distance, lowers the costs of worn-out vehicles and raw material costs. The decrease in travel time per trip holds driving costs down."*— said the representative of Hiep Thanh Transport Company (Binh Thuy, Can Tho).

Hypothesis 4: The CLBP will lead to the growth in containerized road freight across three provinces

One of the hypotheses given for this evaluation is that the CLBP will lead to a growth in containerized road freight across the three provinces.

The interviews show that **the Cao Lanh Bridge and Connectivity Project has increased containerized road freight**. The representative of An Giang Department of Industry and Trade said, *"After Cao Lanh and Vam Cong bridges were inaugurated, the number of containers operating in the province has increased. For example, some logistics companies in Ho Chi Minh City open branches at My Thoi port to transport goods by tractor to Ho Chi Minh City"*. This finding is also consistent with the results of interviews with transport operators. Besides, according to the traffic count data in the BCA report, the average number of containers crossing the Cao Lanh Bridge per day is 142, this number is 364 at the Vam Cong Bridge.

In addition, transport operators claim that CLBP has a direct impact on their container purchasing decisions. The representative of Sa Dec Transport Cooperative (Sa Dec, Dong Thap) said, *"In the past, we did not buy containers because the container could not board Cao Lanh ferry, which was very disadvantageous. When the Cao Lanh and Vam Cong bridges were inaugurated, the road transport system developed. We decided to buy the container"*. He also shared, *"The first container of our cooperative was purchased right after the Vam Cong Bridge was inaugurated."*

²¹ The second quote is taken from an IDI carried out in the baseline survey.

It can be seen that from the significant improvement of the road transport system, the Cao Lanh Bridge and Connectivity Project have fueled the growth in containerized road freight in the region.

Hypothesis 5: The CLBP will stimulate the development of Cao Lanh as an intra-provincial and inter-provincial bus passenger transit center, with increased tourism visitation and quicker access to/from Ho Chi Minh City

Thanks to the Cao Lanh Bridge and the Connectivity Project, Cao Lanh has become a transit center for intra-provincial buses, but not for inter-provincial buses yet.

Intra-provincial bus passenger transit center

On the north bank of the Tien River, there are Cao Lanh, Hong Ngu, Thanh Binh, Tan Hong, and Tam Nong. The remaining districts, including Sa Dec city, Lap Vo, Lai Vung, and Chau Thanh, lie on the south bank of the Tien River. At the benchmark survey, there are very limited bus routes running between these two parts of Dong Thap as the route's revenue could not cover its cost. Therefore, Cao Lanh Bridge plays a crucial role in connecting the two regions, divided by the river system. The representative of Mai Linh Group's Dong Thap branch said, *"Without Cao Lanh Bridge, there is no Cao Lanh - Sa Dec bus route. After the Cao Lanh Bridge was inaugurated, Cao Lanh residents who want to go to Sa Dec can go by bus."*

By bridging the region, **the Cao Lanh Bridge has created favourable conditions to promote tourism development within Dong Thap province.** People from Sa Dec can easily visit Nguyen Sinh Sac historical site at Cao Lanh, and then visit other tourism sites such as Tram Chim and Xeo Quyt. Similarly, people from Cao Lanh were able to travel smoothly to visit Sa Dec flower village. The greater travel demand has stimulated passenger transport services to develop.

"Thanks to Cao Lanh Bridge, Dong Thap's tourism industry has developed as it is now. Without Cao Lanh Bridge, Sa Dec flower garden is just a small flower garden for people to buy flowers. Now, the Sa Dec flower garden has become a sightseeing area for tourists. Residents often go to Sa Dec flower village, Le Dung tangerine garden, and the ecological garden in Chau Thanh when they have free time at weekend." – said Mai Linh Group JSC's Manager of Dong Thap branch

IDI with the representative of Mai Linh Group's Dong Thap Branch

Inter-provincial bus passenger transit center

The Cao Lanh Bridge and the Connectivity Project have brought positive impacts to the road transport system in the Mekong Delta, **which has boosted tourism growth in Dong Thap province.** The representative of Dong Thap Department of Industry and Trade said, *"In the past, tourists to Dong Thap on average increased more than 8% per year. However, each year after the construction of Cao Lanh and Vam Cong Bridge, this number nearly doubled. Specifically, in 2015, Dong Thap had nearly 2 million tourists. By 2019, this number is nearly 4 million tourists."*

However, the interviewees said that **Cao Lanh has not yet met the expectation of becoming an inter-provincial bus passenger transit center.** This statement is also consistent with the results of interviews with transport enterprises in 2017. According to them, although Dong Thap has many valuable ecotourism resources, the surrounding provinces have distinguished characteristics that attract tourism. Can Tho has the location advantage by lying in the center of the Mekong Delta, with relative proximity to My Thuan and Can Tho Bridge. Having a modern airport, Can Tho plays a vital role as the connecting point to other provinces in the Delta. Kien Giang is famous for beach tourism and U Minh Thuong primitive forest, while An Giang is well-known for spiritual tourism.

Hypothesis 6: The CLBP will stimulate the growth in transport facility and employment in transport sector within all three provinces

The results of interviews with transport operators in all three provinces show that **the Cao Lanh Bridge and the Connectivity Project have had a positive impact on the development of transport enterprises**. The development of transport enterprises comes from two reasons: the increase in transport demand (including freight and passenger transport) and the expansion of routes operating after two bridges come into operation.

Transport operators say the two projects have driven **growth in both passenger and freight demand**. The shortening of waiting times at Cao Lanh and Vam Cong Ferry Terminals has **increased the demand for passenger transport**. *"In the past, the waiting time for the ferry and travel was long, so many people, especially those suffering from motion sickness, did not want to travel. However, now there are Cao Lanh and Vam Cong Bridges, it helps people travel faster and more comfortably. For example, the number of passengers going to Nui Ba (An Giang) of my business has increased 2 to 3 times."* – said the representative of Vu Linh Transport Company (Cai Rang, Can Tho).

In addition, transport operators claim **there has been a growth in demand for freight by road**. That may stem from the general economic development in the Mekong Delta region. On the other hand, transport operators believe that thanks to the project, there has been a shift from transporting goods by inland waterways to transporting goods by road, especially fresh fruits, because fresh produce requires to be shipped within a tight timeframe and in a short amount of time. In the past, agricultural goods were mainly transported by boat or barge. However, at present, transporting goods by container or truck helps to save time and transport costs. *"For example, to transport a shipment of 100 tons of rice, if transported by boat, the cost is VND 90,000/ton; if transported by container or truck, the costs are VND 80,000/ton, and the travel time is faster"* – said the representative of Sa Dec Transport Cooperative (Sa Dec, Dong Thap).

Another reason for the growth of the transportation business is that **the Cao Lanh Bridge and the Connectivity Project has helped transport operators expand their routes of operation**. In the past, some transport operators did not accept freight to destinations that had to pass through ferries due to safety reasons, long travel times and high transportation costs. Following the inauguration of Cao Lanh and Vam Cong bridges, transport operators have expanded their routes of operations to provinces and districts that were previously divided by a network of rivers. That directly affects the revenue of the business in a positive way.

"After inaugurating two bridges, my business decided to expand the operation route to areas that were previously divided by the river network, such as Cao Lanh city, Cho Moi district. Previously, we did not accept shipments that had to go through the ferry. Because the cost and time for each shipment were huge and our heavy trucks would not be safe to board the ferry... The business's revenue has increased thanks to the expansion of the route to Dong Thap province."

IDI with the representative of Hiep Thanh Transport Company (Binh Thuy, Can Tho)

As analyzed above, it can be seen that **the Cao Lanh Bridge and the Connectivity Project has contributed to promoting the development of transport enterprises** in all three provinces. In addition, the growth of the transport business is closely related to the growth in transport facilities and employment in the transport sector.

In fact, interviews with transport operators provide evidence of an increase in the number and types of vehicles. Typically, in the case of Sa Dec Transport Cooperative, they had 300 vehicles in 2015, which are mainly buses, but this number increased sharply to 1,000 vehicles of various types *after five years*. Similarly, growth in transport facilities is also found in other transport operators. Besides, *"Thanks to the connection project, the traffic in the area is more convenient, which is one of the great motivations for businesses to decide to buy more means of transport."* – said Hiep Thanh Transport Company representative (Binh Thuy, Can Tho).

For transport operators, growth in the number of owned vehicles always translate into further growth in employment in the transport sector. For example, in the case of Mai Linh taxi, Dong Thap branch, within five years from 2015, the number of employees of the enterprise increased from 60 to 200 people. The increased recruitment demand of transport operators also leads to a shortage of labor in the region, especially

drivers. The representative of Sa Dec Transport Cooperative (Sa Dec, Dong Thap) said, "Currently, Dong Thap province is facing a serious shortage of driver labor resources for fast-growing transport enterprises."

In addition, the interviews with transport operators found no difference in the impact of the two projects on employment by gender.

3.2.2 Businesses in Industrial Parks

In-depth interviews were conducted with six enterprises whom differentiate in; length of time in operation, areas of service, size of enterprise. Despite the small number of interviews, findings from those still reflect the situations of the enterprises.

Hypothesis 1: The CLBP investment will generate accessibility and mobility improvements, leading to a wider socio-economic development benefits within and among the three provinces

All informants agreed that the Cao Lanh Bridge and the Connectivity Project has brought about mobility improvement, especially in the transportation of finished goods, for their enterprises. Specifically, the enterprises in the qualitative study mainly export finished goods to international markets via container terminals, such as Cat Lai – Hiep Phuoc in Hochiminh City, Cai Mep in Ba Ria – Vung Tau, or international trans-shipment port like Tan Cang Port in Can Tho.²² Five years ago, without the Cao Lanh and Vam Cong Bridges, their drivers had to take detours or use ferries for transporting goods to those ports. However, the inauguration of the two bridges has enabled the drivers to travel directly across Hau and Tien Rivers. The shortened transport distance and time saved waiting for ferries has allowed the outward bound transportation of these enterprises to be much more convenient. In detail, the transport time has been reported to be reduced by 1-2 hours, on average.

"In the past, our container drivers had to take a detour to reach Can Tho. Thanks to the inauguration of the Vam Cong Bridge, our transporting time decreases by 0.5 - 1 hour per trip".

IDI with the representative of Dong A Seafood Company, Binh Long Industrial Park, An Giang

"Now, firms in An Giang could transport goods across the Vam Cong Bridge, shortening about 35% of the shipping time, equivalent to 1.5 - 2 hours."

IDI with the representative of economic zone authority in Can Tho

"In 2017, we had to use ferries for transporting goods to Hochiminh City. Now, we could travel across the Project's bridges. Shipping time accordingly goes down by 1-2 hours."

IDI with the representative of Kovie Vina Company, Binh Long Industrial Park, An Giang

Nevertheless, the extent of the Cao Lanh Bridge and the Connectivity Project's impact on transportation of finished goods varies among the enterprises and is somewhat dependent on their geographical locations. For instance, the enterprises in Binh Hoa and Binh Long Industrial Parks (An Giang) and Thot Not Industrial Park (Can Tho) usually use the Cao Lanh and Vam Cong Bridges to transport goods to Ho Chi Minh City²³ (the second route in Figure 9). Therefore, transportation benefits created by the Cao Lanh Bridge and the Connectivity Project are more significant for them. Meanwhile, the representatives of those enterprises in the Sa Dec Industrial Park (Dong Thap) claimed the Cao Lanh Bridge and the Connectivity Project had little impact on their outbound transportation as they mainly chose to take another route (the first route in Figure 9) to the Trung Luong Expressway (via NR80 and NR1A) rather than travelling across the invested bridges.

²² Sai Gon Newport Corporation (SNP) manages these ports. According to the most updated information on its website, the import-export container throughput of SNP has accounted for more than 60% of the national market share.

²³ At the moment, all road-freight goods from the region need to be transported via the Trung Luong Expressway to reach Ho Chi Minh City.

Figure 9. Geographical locations of the industrial zones for qualitative study



Source: Google Map

Mobility improvement, though less pronounced, is also detected in the enterprises' transportation of raw materials. To be specific, travel convenience created by the Cao Lanh Bridge and the Connectivity Project has contributed to reducing transport time of raw materials. As shared by the representative of Sethia Hemraj Rice Oil Company (Sa Dec Industrial Park, Dong Thap), road freight across the two bridges has made their raw material – rice bran to be delivered faster²⁴. The shorter delivery time, then, helps to ensure biochemical stability of rice bran, minimizing decomposition of its lipids into free fatty acids (FFA) that are unsuitable for human consumption. The benefit concerning reduced transport time of raw materials is also appreciated by An Giang Samho Company (Binh Hoa Industrial Park, An Giang). The representative of this enterprise said, “We specialize in producing sports shoes with raw materials imported from abroad. All these raw materials are transported from Cat Lai Port in Ho Chi Minh City to our enterprise. Thanks to the Cao Lanh Bridge and the Connectivity Project, the delivery time declines by 1-1.5 hours as we no longer have to use ferries for the transportation”.

The eased transportation of goods is claimed to improve the enterprises' accessibility to both input and output markets. First, compared to five years ago, enterprises could now access a broader range of suppliers with greater availability and higher quality inputs. Specifically, the representative of the Kovie Vina Company (Binh Long Industrial Park, An Giang) responded that the number of suppliers working with his enterprise has doubled since the implementation of the two projects. According to the representative of Sethia Hemraj Rice Oil Company (Sa Dec Industrial Park, Dong Thap), the Cao Lanh Bridge and the Connectivity Project have eased their transportation of raw material, providing them with a greater chance of purchasing raw material with better quality from Can Tho and An Giang. The improved mobility is also considered as a critical driver promoting the enterprises to develop their output markets, both domestically and internationally²⁵.

²⁴ The enterprise previously transported rice bran by inland waterway. Typically, transport time by this approach is much longer than that by road freight. Also, waterway transportation is more likely to be delayed due to extreme weather events, such as heavy rainfall or flooding.

²⁵ The example that improved mobility has encouraged the enterprise to increase number of trips exporting finished goods per day will be mentioned in the next section.

"We used to export the finished goods only. However, the domestic transportation has been bettered with the Project's infrastructure. Thus, from 2021, we decide to employ the domestic markets and sell goods to customers in Dong Thap and Can Tho as well."

IDI with the representative of Kovie Vina Company, Binh Long Industrial Park, An Giang

Hypothesis 3: The CLBP will expand and deepen the labour market areas for Cao Lanh residents, with improved road access to other provincial centres for additional employment opportunities

Internal migration of local labourers has been a controversial issue in the Mekong Delta for many years. Anh et al. (1997) found that employment opportunities and economic factors are key drivers of migration flows from less developed provinces to more developed provinces. The most popular destinations of Mekong Delta's labourers were Ho Chi Minh City and Binh Duong province due to the concentration of industrialization and service development in that region (Huy, 2011). The emergence of industrial hubs in the Southeast region improved access of the Mekong Delta's labourers to non-farm jobs, yet caused brain drain problems and further exacerbated economic inequality between the regions.

The Cao Lanh Bridge and the Connectivity Project somehow have contributed to addressing this issue as **the two projects, since their implementation, have attracted investors to open more enterprises in the project area, thus, brought about additional employment opportunities for local residents**. To be specific, the representative of Dong Thap Department of Planning and Investment declared that *"the bridges [in Cao Lanh Bridge and the Connectivity Project] have changed the whole provincial planning as the province now focuses on carrying out the projects in zones between the two bridges"*. According to this informant, Dong Thap attracted 56 projects with more than VND 7,300 billion in 2018 and 2019, thereby creating more jobs for the residents of Dong Thap in particular and Mekong Delta in general.

"Mobility improvements [created by the CMDCP] have boosted the number of enterprises in our industrial zones. More employment opportunities are offered to the residents consequently."

IDI with the representative of Dong Thap Economic Zone Authority

"Thanks to the Project, An Giang has received many positive signals of investment attraction. In 2017, there were 83 projects with registered capital of VND 14,500 billion invested in the province. The figure increased by 19%, compared with that of 2016. Notably, in the first six months of 2021, despite the impacts of COVID-19, the province attracts 347 newly registered enterprises with registered capital of VND 4,535 billion."

The Cao Lanh Bridge and the Connectivity Project also help expand labour market opportunities for the residents by reducing the commuting time from their homes to their existing workplace. Specifically, in the past, the Cao Lanh residents typically did not work in the Sa Dec Industrial Park due to the inconvenience of travelling between the North and the South bank of Tien River. The inconvenience had long been seen as a barrier hindering those people to seek employment opportunities there. According to the representative of Cadovimex II Company (Sa Dec Industrial Park, Dong Thap), before the bridge construction, it took more than 40 minutes, including ferry time, for those living in Cao Lanh to travel from their homes to the industrial park. Now, the invested bridges have eased their commute and encouraged them to work in Sa Dec when travelling time reduces by 25% as they no longer need to use ferries to go to the workplace.

Hypothesis 4: The CLBP will lead to the growth in containerised road freight across all three provinces (Achieving economies of scale, reduced numbers of individual small truck movements, and lower costs per unit of freight)

Though IDIs with transport operators and An Giang Department of Industry and Trade reveal prominent growth of the containerised road freight, informants representing the enterprises in industrial park could not spot any significant change in this regard²⁶. Specifically, barge and truck remain the most

²⁶ The bridges have just been inaugurated since 2019. Maybe it takes time for surrounding facilities to be completed, connect with the Project's investments, and enhance containerised road freight.

common means for goods transportation of these enterprises. On the one hand, barge transport is an optimal choice for enterprises if they have no pressure on shipping time. According to the Vietnam Logistics Report (Ministry of Industry and Trade, 2019)²⁷, loading capacity of a barge is 25 times higher than that of a truck. Additionally, as shown in the report, the cost of waterway transportation is only half or one-third compared with road transport. Also, barge transport is found to be more favoured by seafood processing²⁸ enterprises in the qualitative study as their raw material - fresh aquaculture produces, often come from the Mekong region, and the enterprises could take advantage of the Delta's inland waterway to transport them.

"We need to transport fish (our inputs) by barge to ensure that they are alive and fresh till they reach our company. The fish typically come from Dong Thap or nearby provinces in the Mekong Delta; thus, we could transport them through the domestic inland waterway."

IDI with the representative of Cadovimex II Company, Sa Dec Industrial Park, Dong Thap

On the other hand, truck is preferred over container for two main reasons. First, truck transport is more suitable with the Mekong Delta's existing infrastructure and logistic system. In various sizes, trucks could easily transport goods on most types of roads in the region. Meanwhile, transporting by containers is only enabled with specific requirements on road condition, especially width and quality. Second, truck transport is opted due to its lower cost. Specifically, the truck transport sector was formed quite early²⁹, meaning the number of operators providing services for this mode of transport are now far higher than that for containerised road freight. These operators, therefore, are forced to charge lower transport costs to maintain their competitiveness.

Indeed, the Cao Lanh Bridge and the Connectivity Project are claimed to have spurred the enterprises to increase their number of trips for transporting finished goods by truck per day. *"The bridges have made the transportation of goods more convenient, promoting us to transport more. In 2021, the number of trips transporting outputs by truck per day is 20, two to four times higher than the figure of 2017"*, shared by the representative of NV Apparel Limited Company (Binh Hoa Industrial Park, An Giang). Also, according to this informant, the higher number of trips per day is an essential factor impacting his enterprise's decision to expand production capacity. This action, in turn, leads to a decline in the average unit cost of production, helping the enterprise approach economies of scale.

The projects initial impact of lowering transport costs is also highlighted in the IDIs. To be specific, as shared by DongA Seafood Company and Kovie Vina Company (Binh Long Industrial Park, An Giang) representatives, the transporting distance has been shortened because the drivers could now travel directly across the bridges instead of taking detours as compared with five years ago. Thus, fuel costs are reduced. Although these informants could not provide specific estimates illustrating the above finding, they presumed that the cost savings were moderate. The bridges may not have been in use long enough to have made a noticeable impact on this.

3.2.3 Local Authorities – Provincial and Regional-Level Impacts

Besides numerous impacts on the local households and businesses, the Cao Lanh Bridge and the whole Connectivity Project will bring long-term impacts to the socio-economic development of three provinces of Dong Thap, An Giang, Can Tho, as well as the Mekong Delta in general. These insights were obtained from the results of desk research using online resources and qualitative interviews with local authorities and could be classified into three major impact groups on transport infrastructure, economic investments, and tourism.

²⁷ Read further at: <https://gosmartlog.com/wp-content/uploads/2019/12/Bao-cao-logistics-viet-nam-2019.pdf>

²⁸ The number of seafood processing companies in the Mekong Delta accounted for approximately 47% of the total number of seafood processing companies nationwide. Please refer to this post for further information: <https://thefishsite.com/articles/measures-to-develop-seafood-processing-industry-in-mekong-delta>

²⁹ Read further at: <https://sapuwa.com/so-sanh-cac-loai-hinh-van-chuyen-hang-hoa-noi-dia-viet-nam.html>

Towards a Comprehensive Road Infrastructure System

The most prominent impact of the Cao Lanh Bridge and the Connectivity Project is that they have improved the inter-provincial road system and connectivity in Dong Thap and the Central Mekong Delta. Before the construction of Cao Lanh Bridge, NR 30 and NR 80 were the only two highways passing through Dong Thap and connecting this province with the NR 1A at My Thuan Bridge. There was no vertical road crossing Tien and Hau rivers to connect Dong Thap with the neighbouring provinces such as An Giang, Kien Giang, and Can Tho. Travel between Cao Lanh and Sa Dec, two economic centers of Dong Thap, as well as between Dong Thap and the neighbouring provinces depended heavily on the operations of the Cao Lanh and Vam Cong ferries.

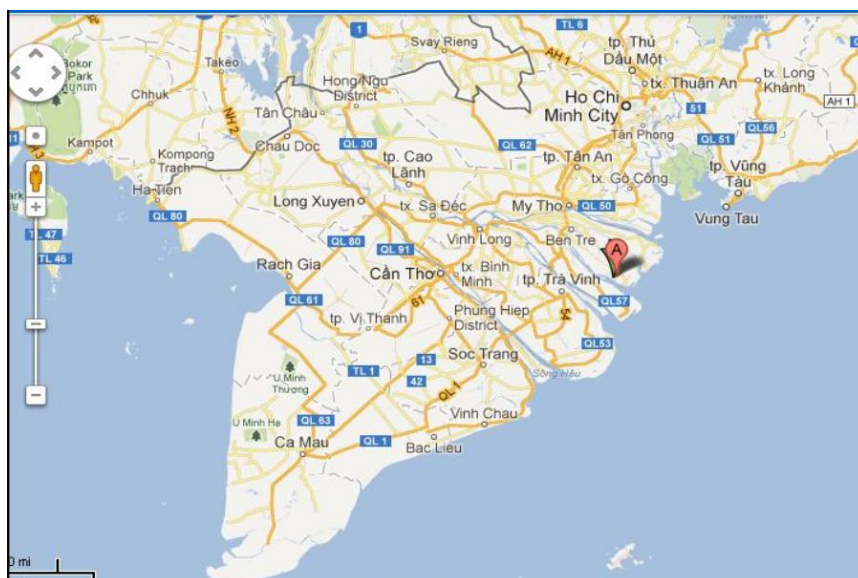


Figure 10. Highway network in the

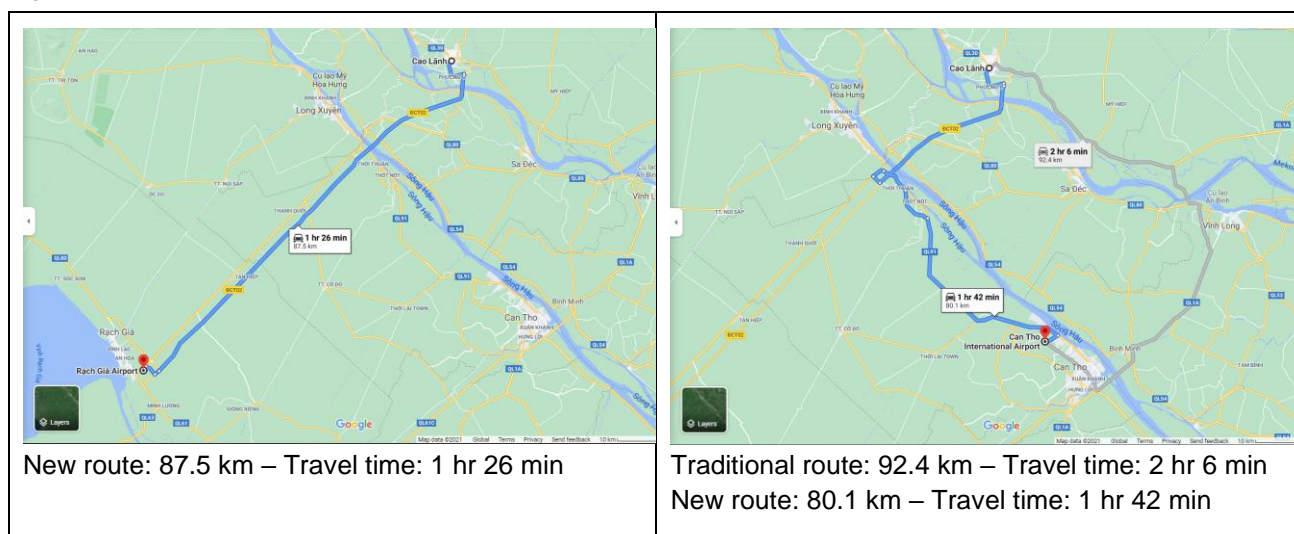
Mekong Delta before the Connectivity Project

Source: Fulbright University

The Cao Lanh Bridge helps resolve the problem by bridging the North and South of the Tien rivers to connect Cao Lanh and Sa Dec. Moreover, the whole Connectivity Project has created a vertical axis in the Central Mekong Delta to connect Dong Thap with the neighbouring provinces, reducing the distance and travel time between those provinces. This improvement was highly appreciated by the authorities of all surveyed provinces, especially in Dong Thap and An Giang. For example, the representative of Dong Thap Department of Transport mentioned that “[In the past] To travel from Dong Thap to An Giang, we had to make a longer trip to Can Tho before turning back and following NR 91 to head back to An Giang. But now we can use the two bridges to travel directly to An Giang. Thus, travel time decreases significantly.”

Another improvement in terms of inter-provincial connectivity is the reduction of road distance and travel time from Dong Thap to the local airports. As represented in Figure 11, the distance from Cao Lanh (Dong Thap capital) to the Can Tho international airport was shortened by 12 km and travel time has been reduced by 24 minutes (equivalent to 19%) when traveling through the Cao Lanh and Vam Cong Bridges instead of the traditional route via My Thuan Bridge and Vinh Long. Travel from Cao Lanh to Rach Gia domestic airport is improved even more after the Connectivity Project contributed to the establishment of a new highway between the two locations, which is significantly shorter than the traditional route via My Thuan Bridge – Vinh Long – Can Tho. Travel time from Dong Thap to those airports is expected to be reduced more in the near future when the connecting roads between the Cao Lanh and Vam Cong Bridges and between Vam Cong Bridge and Can Tho are upgraded to expressway. As Dong Thap will be around 1-hour away from the local airports, the province will have better access to air transport and thus, will be more attractive to tourists and business travellers.

Figure 11. Road distance and travel time from Dong Thap to Rach Gia airport (left) and Can Tho international airport (right)

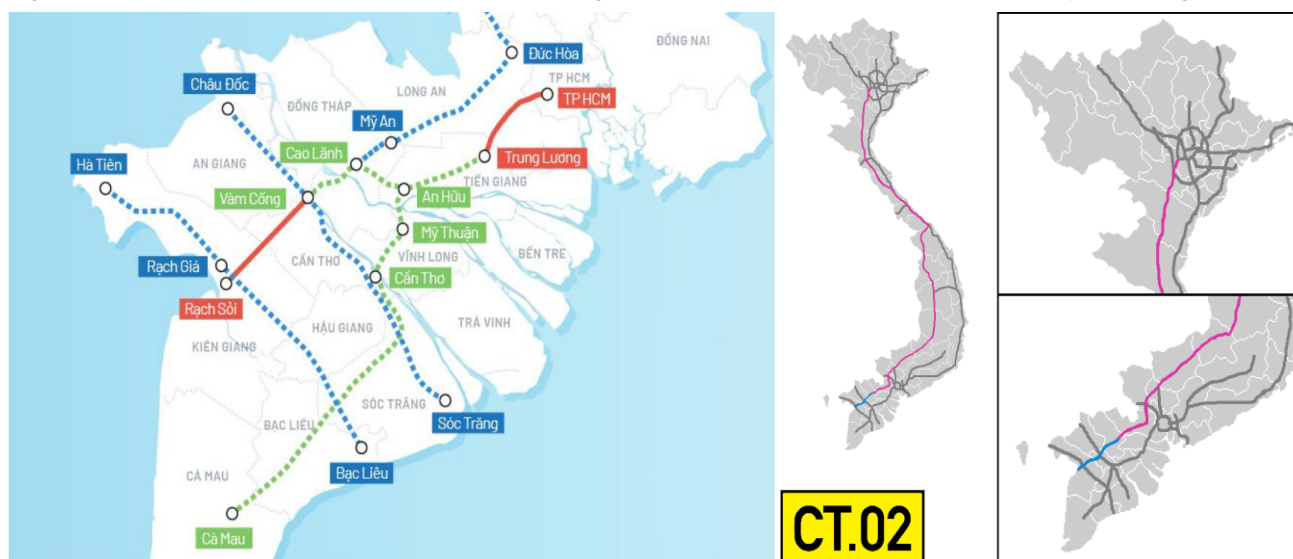


Source: Google Maps

The long-term impacts of the Cao Lanh Bridge and the Connectivity Project are also represented by their role in stimulating Government’s investments in road transport infrastructure in the local area. At the provincial level, Dong Thap and An Giang have implemented several road investments to maximize the benefits brought by the Connectivity Project. A representative of Dong Thap Department of Planning and Investment considered the Cao Lanh – Vam Cong highway as the centre of all infrastructure development plans of the province. Indeed, to take advantage of the Cao Lanh – Vam Cong highway, Dong Thap is upgrading a part of the NR 30 from Cao Lanh to Hong Ngu, a western border town of the province, the PR 848 to connect the highway with Sa Dec port and the PR 849 to connect the highway with NR 80. Meanwhile, An Giang Department of Planning and Investment informed that a Long Xuyen city bypass connecting the Vam Cong Bridge with the NR 91 was being invested and would start construction by the end of 2021. Once completed, the bypass would share the traffic volumes of the NR 91 and thus, reduce traffic congestion and road accidents on the NR 91, especially during the festival of the Goddess of the Realm (Bà Chúa Xứ), the biggest spiritual festival in the Mekong Delta.

At the regional level, the Cao Lanh Bridge and the Connectivity Project could be considered as a catalyst for the development of an expressway network in the Mekong Delta. Before the construction of Cao Lanh bridge, NR 1A was the sole arterial link from the Mekong Delta to Ho Chi Minh City and was overloaded with traffic volumes due to the increasing transport demand in the region. The Cao Lanh and Vam Cong bridges and the connecting highways constructed by the Connectivity Project have provided a base to establish the second vertical transport axis in the Mekong Delta that links Kien Giang, An Giang with Ho Chi Minh City via Dong Thap. In 2020, the Ministry of Transport developed and submitted to the Prime Minister an expressway development plan for the Mekong Delta, in which 7 expressways would be invested in the medium-term public investment plan for period of 2021-2025. Those 7 expressways with an estimated total budget of VND 150,000 billion (approx. 6.5 billion USD) are expected to upgrade and complete the road infrastructure network of the Mekong Delta, reducing travel time and improving inter-provincial connection in the region, and between the region and Ho Chi Minh City.

Figure 12. Expressway development plan in the Mekong Delta (left) and the North-South expressway No.02 (right)



Source: VnExpress online newspaper & Wikipedia

As a part of the expressway development plan, the connecting road between Cao Lanh and Vam Cong Bridge is being upgraded to expressway by the end of 2021, allowing a maximum speed of 100 km per hour. Upon completion, this expressway will link up with Lo Te – Rach Soi expressway to facilitate road transport between Kien Giang and Dong Thap. Besides, an expressway that connects Cao Lanh with An HUU (Tien Giang province) is planned to be constructed by 2025, connecting the Cao Lanh – Vam Cong expressway with the NR 1A and the Ho Chi Minh City – Can Tho expressway. Another highway from Cao Lanh to My An (Dong Thap) will be also constructed by 2025, and will be upgraded to expressway by 2030 to link up Cao Lanh with the current NR N2 that leads to Duc Hoa (Long An province) and the west gateway of Ho Chi Minh City. Since the roads between Cao Lanh – An HUU and Cao Lanh – My An are currently narrow and degraded, those expressway investments were highly recommended by the authorities and transport operators in Dong Thap and An Giang and are expected to remove the road “bottleneck” from Cao Lanh to Ho Chi Minh City, allowing heavy vehicles such as articulated trucks to travel easily. In the long term, the Cao Lanh – Vam Cong expressway will join with the Ho Chi Minh NR to form the North – South expressway No.02 in the west of Vietnam, promoting the circulation of goods between the Central Mekong Delta and other provinces of Vietnam.

Stimulation of investments in the Central Mekong Delta

As the Cao Lanh and Vam Cong Bridges play an important role in improving road transport in the region, they are regarded by the provincial authorities as a boost to the local economy. **The economic changes brought by the Cao Lanh Bridge and the Connectivity Project can be clearly observed in the rapid investment growth of Dong Thap and An Giang, two provinces receiving direct transport benefits from the bridges.**

Investments in Dong Thap and An Giang have increased rapidly since the completion of the two bridges.

The Dong Thap Department of Planning and Investment reported that the investment value into the province soared after the Project, especially in 2019. In fact, the province received 26 investment projects with a total registered budget of VND 2,000 billion in 2018, and this number rose to 30 projects and VND 5,300 billion in 2019. An Giang also witnessed an investment growth during that period, with VND 15,251 billion in 2017, 29,444 billion in 2018, and 17,636 billion in 2019. The investment growth in the two provinces only discontinued in 2020 due to the effects of COVID-19.

In terms of investment sector, both provinces have noted that investment has been focused in seafood and agricultural processing, tourism, and real estate. A notable investment is the High-tech dairy farming and milk processing project implemented in An Giang in 2021 by TH True Milk, a big dairy corporation in Vietnam. This is the biggest high-tech dairy farming and milk processing in the Mekong Delta, feeding an estimated 10,000 cows and producing 135 tonnes of fresh milk per day. By facilitating freight transport between An Giang and Ho Chi Minh City, a big market of Southern Vietnam, the Cao Lanh – Vam Cong highway was reported to promote

the OCOP project which has been developing a signature agricultural product in each commune of An Giang. Explaining the reason behind these investments, a representative of An Giang Department of Planning and Investment shared that *“The [Connectivity] Project has reduced travel time from An Giang to Ho Chi Minh City by 1 hour, thus, it helped alleviate the investors’ concerns about the long transit time and high delivery costs for raw materials and goods.”* As the Central Mekong Delta has already possessed strengths in raw material and labour sources, reduced transit time would provide investors from Ho Chi Minh City more incentives to invest in agricultural processing in the region. Such investments would benefit farmers greatly by increasing the agricultural product uptake and would generate more employment opportunities for local workers.

Investments in the industrial parks of Dong Thap, An Giang, and even Can Tho have also benefited from Cao Lanh and Vam Cong bridges. As the two bridges greatly facilitate freight transport from the local industrial parks to Ho Chi Minh City, the number of potential investors increased, and the investment sector was reportedly enlarged. The representative of Dong Thap Economic Zone Authority shared that *“In the past, it was difficult to call for investments in the provincial industrial parks due to the undeveloped transport infrastructure... After the bridges were constructed, transport was improved but it took a while before the impacts could be clearly observed. In late 2020 and early 2021, there were more investors coming and proposing to invest in the locations near the Cao Lanh – Vam Cong highway.”* Faster and more convenient freight transport was also reported to revive the Thot Not industrial park which is located near the Vam Cong Bridge in Can Tho. Some new investment sectors like high-tech are also planned to be promoted in addition to the traditional sectors like seafood and food processing, garment, leather and footwear. The two provinces also take advantage of the Connectivity Project by adjusting their provincial master plan on industrial parks. Indeed, some existing industrial parks in Dong Thap are planned to move closer to the Cao Lanh – Vam Cong highway, and new industrial parks will be constructed near the two bridges, i.e., Tan My industrial park (Dong Thap) at Cao Lanh Bridge and Vam Cong industrial park (An Giang) at Vam Cong Bridge.

Lastly, the Cao Lanh and Vam Cong Bridges have generated opportunities for real estate investments in Dong Thap and An Giang. With a better road transport system, the two provinces become an attractive destination for real estate investors. Numerous real estate projects have been invested in the two provinces since 2016, including the projects of some real estate giants in Vietnam such as Vingroup, FLC, and T&T. In Dong Thap, Vingroup has opened its first shopping mall in the Cao Lanh downtown, while FLC is investing in the construction of a big residential area in Sa Dec. The real estate market in An Giang is also hot as the T&T Group is investing in two residential areas in Long Xuyen with a total budget of VND 8.656 billion. These real estate projects will create more jobs in construction and provide local people with access to modern houses and facilities; thus, they are expected to boost the local economy and upgrade the capital cities of the two provinces.

Opportunities for tourism development

The Central Mekong Delta possesses a high potential for tourism development; however, local tourism is not developed equally between provinces. Among four provinces of Dong Thap, An Giang, Kien Giang and Can Tho, Can Tho tourism is the most developed since the city possesses great advantages in terms of geographical location at the Delta’s heart and a high-level of transport infrastructure with an international airport. Kien Giang is famous for beach tourism with their pearl islands, while An Giang is well-known among tourists by their spiritual sites and festivals. Compared to those provinces, Dong Thap tourism is the least developed, despite having numerous ecological, cultural and historical sites. An obstacle to the tourism development of Dong Thap, as explained in the Benchmark Report, was the separation from the tourism hubs of Can Tho and An Giang by the Tien and Hau rivers and the long ferry waiting time to cross those rivers. That obstacle was expected to be removed by the construction of the Cao Lanh and Vam Cong Bridges.

Two years after the inauguration of the two bridges, there are signs that the bridges and the connecting highway have contributed to a rapid growth in tourism of not only Dong Thap, but also An Giang. Local authorities of both provinces considered that the improved road transport conditions brought by the Project would promote the local tourism if COVID-19 did not spread out. The representative of Dong Thap Department of Industry and Trade informed that *“The number of tourists [visiting the province] has increased by 8% per year. Indeed, that number has doubled since the completion of the bridges, rising from around 2 million tourists*

in 2015 to 4 million in 2019.” Among the tourism sites, Sa Dec flower village is reported to benefit greatly from the bridges as people from the surrounding cities (i.e. Cao Lanh) and provinces (i.e. An Giang, Kien Giang) can conveniently visit the village. An Giang tourism is also reported to enjoy a positive effect from the Cao Lanh Bridge and the Connectivity Project. The An Giang Department of Industry and Trade shared that faster transport thanks to the new bridges had contributed to the tourism growth of the province in the last 5 years. While the total visitor arrivals grew gradually from 5 million in 2010 to 6.5 million in 2020, the proportion of stay-over tourists soared from 1% in the period 2010-2015 to 15-20% in 2020. Nevertheless, the outbreak of COVID-19 had reduced the 2021 tourist arrivals to An Giang by 80%, stopping the continuing growth of tourism, thus, it may take a longer term to assess the impact level of the two projects on local tourism.

In addition to the COVID-19 effects, another factor currently hindering the tourism growth of Dong Thap and An Giang is the lack of appealing tourism products. Indeed, while appreciating the improved road transport conditions brought by the Cao Lanh Bridge and the Connectivity Project, the local authorities only considered them as a prerequisite for tourism development and shared that the local tourism needed to develop its signature products and services to attract and retain the tourists. That means the provinces should create tourism highlights that tell a story about the region and provide tourists with impressive experience. For example, Sa Dec, an old town in Dong Thap which is well-known for its flower village and an ancient house relating to the famous novel and movie “The Lover” by Marguerite Duras, could be promoted as a charming destination in the Mekong Delta by adding appropriate tourism activities. Interestingly, the Cao Lanh Bridge itself could also be a sight to see on the journey to the Mekong Delta as the local authorities and transport operators observed that numerous tourists and local habitants enjoyed coming to the bridge for sightseeing, checking in and live streaming. The tourism potential of the region remains high and is waiting for a proper development plan to maximize it.

3.3 Benefit Cost Analysis

The First BCA Report submitted in August 2020 was based on the results of both the benchmark travel surveys undertaken in March 2017 of the ferry operations³⁰ and the travel surveys undertaken after the completion of Cao Lanh Bridge Project undertaken in March 2020³¹. A wide variety of travel data was collected included trip purposes, origin and destination, trip frequency, the proportion of women and men among passengers, quantities of freight transported. In the post construction surveys responses on perceptions of changes in travel reliability and safety were also sought. Together the 2017 and 2020 travel surveys permitted the quantification of changes in travel impacts (time, distance), the characteristics of vehicular traffic, and the quantities passengers and freight carried, in order to quantify and monetize the economic benefits and costs of the project. This Second Benefit Cost Analysis Report (July 2021) was updated based on additional surveys undertaken in June 2021. These additional surveys were quite limited in scope and sought only to confirm the direction and quantity of travel from 2020 to 2021 in accordance with the design of the overall Impact Evaluation.

The entire CMDCP was conceived as an integrated project that required the completion of both the Cao Lanh and Vam Cong Bridges, and the connecting expressway, to deliver the full, planned connectivity benefits. Consequently, the principal BCA is of the entire CMDCP with the secondary BCA undertaken of the Cao Lanh Bridge alone.

3.3.1 Effects of COVID-19

The global COVID-19 virus pandemic also impacted Vietnam by early 2020 with restrictions on domestic travel and assembly introduced across the country in March of that year. As described in the First BCA Report, the observed main effect of COVID-19 on travel in March 2020 was a reduced demand for motorcycle use and bus travel in the Mekong Delta. Though at the time there was no mandated lock-down, the public had adopted voluntary social distancing measures based on official advice. There was also a reduction in economic activity that appeared to reduce the quantity of travel. Due to Vietnam faring well against COVID-19 at the time these

³⁰ Reported in ASI/ MDRI 2017. *Final Benchmark Report*. August.

³¹ Although the Cao Lanh Bridge was completed in May 2018, the completion of the Vam Cong Bridge was delayed by one year to May 2019. The post construction travel surveys were undertaken in March 2020 at the same time of year as the benchmark surveys to eliminate as far as possible seasonal effects and allowing sufficient time to allow new travel patterns to be established and settle down.

restrictions were largely lifted by June 2020. However, the quantity of travel after June may have been somewhat lower than a normal, COVID-19 free level of demand. A second, bigger wave of COVID-19 commenced in May 2021. A temporary suspension of inter-urban bus services throughout the Mekong Delta together and other restrictions were introduced on the 31st May, 2021.

Hence, both the post-project travel surveys in March 2020, and the additional surveys in June 2021, were impacted by the effects of COVID-19 with generally lower levels of travel than what have been the case without COVID-19 in a 'normal' situation.

3.3.2 Changes in Vehicular Usage at Cao Lanh and Vam Cong

2020 versus 2017

Key features of daily demand of each bridge in 2020 (corrected for the effects of COVID-19) compared to the ferries in 2017 are:

- › The estimated traffic use of the Cao Lanh and Vam Cong Bridges in 2020 was respectively 50% and 28% higher than use of the ferries in 2017.
- › Excluding motorcycles that are making local trips, it is estimated that about 6,800 cars, vans, buses and trucks per day in 2020 diverted to the Cao Lanh Bridge from other routes, of which about 4,900 vehicles per day also used the Vam Cong Bridge.
- › The higher growth at Cao Lanh compared to Vam Cong was mainly due to traffic diversion from the My Thuan Bridge on NH1A. In contrast, the lower growth of traffic on the Vam Cong Bridge was because the previous Vam Cong ferry was already an important route for My Thuan bridge traffic traveling to/ from the Delta's south western provinces and traffic growth.
- › Total persons using the Cao Lanh and Vam Cong Bridges in 2020 were estimated to have grown by 84% and 41% respectively compared to use of the ferries in 2017. The sharp growth in persons at Cao Lanh in 2020 compared to 2017 was due to the increase in use of motorcycles, buses and trucks. At Vam Cong, there was a decline in numbers of persons using motorcycles and buses compared to 2017. However, the absolute numbers of total persons in 2020 remained higher at Vam Cong than at Cao Lanh.
- › At both Cao Lanh and Vam Cong, the observed proportion of women of total persons declined from about 45% in 2017 to about 29% in 2020 for reasons that are unclear. It is possible that this reduction in the relative frequency of longer distance travel by women compared to men was a result of both the effects of both COVID-19 and broader socio-economic change that occurred after 2017.
- › Total freight carried across bridges per day in 2020 was 37,300 tonnes up from 10,400 tonnes carried on the two ferries in 2017 an increase of 260%, with the share using Cao Lanh growing from 15% in 2017 to 40% in 2020.

2020 to 2021

- › Daily demand on each bridge observed in June 2021 after the second wave of COVID-19 spread across the country showed traffic volume reductions of 30% on both bridges compared to March 2020. Motorcycle volumes were more sharply reduced compared to 4+ wheeler volumes³².

Because traffic volumes have been clearly suppressed by the direct and indirect effects of COVID-19 it is difficult to establish from recent data what constitutes normal traffic volumes. Consequently, the estimates of 'normal' traffic volumes made in the first BCA report (July 2020) for 2021 and subsequent years are still considered

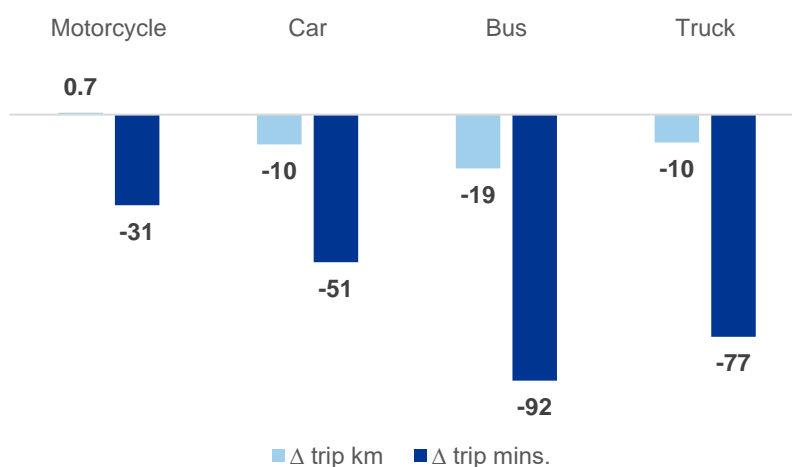
› ³² After the strong travel restrictions due to the second wave of COVID-19 that commenced in late May 2021 show that motorcycle and 4+ wheeler use in June 2021 dropped by 25% and 31% respectively compared to the volumes in May. But even the May 2021 traffic estimates would have been affected negatively by the indirect effects of COVID-19 that had persisted throughout the second half of 2020 and first few months of 2021. The traffic in volumes observed in May 2021 are not considered 'normal' levels of traffic.

applicable. Similarly, the first BCA analysis remains relevant. The BCA results are summarised below and presented in detail in Section 4 of the Second BCA Report contained in the attachment.

3.3.3 Key Impacts

The main drivers of demand for the CMDCP including the Cao Lanh and Vam Cong Bridges are the reductions in travel time due to avoidance of waiting for ferries, savings in distance travelled, and associated improvements in trip reliability and safety through removing the previous ferry crossings. A comparison of travel from the March 2020 surveys with the project compared to March 2017 with the ferries, shows that while motorcycles experienced a small increase in average trip distance (due to the need for some local trips to make more circuitous travel via the bridges), the average trip time saving was significant at 31 minutes per trip (Figure 13). The other vehicle types (cars/vans, buses and trucks) experienced an average saving of over 10 kilometres and over one hour per trip.

Figure 13. Estimated reductions in trip time and distance due to the Project



Source: Consultant; note -ve sign means a reduction in time or distance

Almost 70% of the vehicle drivers using the bridges in 2020 indicated the predictability of their journey had highly improved, while 73% of the drivers mentioned a high improvement in safety³³ compared to use of the ferries in 2017. About another 17% of drivers stated they experienced some improvements in reliability and safety. In contrast, negative responses on the topics were mostly limited at approximately 2% and the balance of respondents did not respond or indicated they did not perceive a change.

Due to the strong demand response and significant estimated trip distance and time savings the present value of user and other benefits was estimated to significantly exceed the present value of project investment, operation and maintenance costs for both the BCA of the entire CMDCP and the Cao Lanh Bridge alone:

- > **CMDCP.** The BCA shows at the central discount rate of 7% the benefit-cost ratio (BCR) for the entire CMDCP is 2.45 indicating that the sum of the discounted net benefits exceeds the discounted project costs by 145%. Accordingly, the NPV is estimated to be USD 532.7 m at the 7% discount rate. The EIRR is estimated to be 13.6%.
- > **Cao Lanh Bridge.** The BCA shows a similar but slightly lower positive BCR of 2.06 to the CMDCP since capital costs are similar although economic benefits are estimated to be 40% of that of the full CMDCP. The NPV is estimated to be USD 194.1 m at the 7% discount rate. The EIRR is estimated to be 12.5%.

The positive economic performance of both the CMDCP and Cao Lanh Bridge are shown to be robust for a series of sensitivity tests with different discount rates (4% and 12%). Since, the project costs are known with some certainty, and the initial demand and benefits are known reasonably well, and the assumptions about

³³Please refer to section 3.11 of the full BCA Report for further detail.

future demand and benefits are quite conservative, the results of the current BCA are also considered to be conservative and confirm the Project's Value for Money.

4 Conclusion

The Cao Lanh and Vam Cong bridges were constructed as part of the Central Mekong Delta Connectivity Project jointly funded by DFAT and ADB to improve road transport infrastructure in the area and provide three surrounding provinces of Dong Thap, An Giang, and Can Tho with better inter-provincial connectivity, thus, aiming for local socio-economic development. Using data of an endline survey conducted two years after the opening of the bridges, this study evaluated the impacts of the Cao Lanh Bridge and the whole Project to the three provinces. It should be noted that the Mekong Delta was heavily affected by COVID-19 at the time of the evaluation.

Results of the endline survey indicate that the Cao Lanh Bridge and the Connectivity Project have yielded positive impacts to the target provinces. The most prominent impact was the improvement of inter-provincial mobility and connectivity in Dong Thap and the Central Mekong Delta. The Cao Lanh Bridge plays a crucial role in the road transport of Dong Thap as it helped connect Cao Lanh and Sa Dec, two economic centers of the province. Moreover, the whole Connectivity Project has created a vertical road axis in the Central Mekong Delta to connect Dong Thap with its neighbours. By replacing old ferries, the bridges reduced travel distance and travel time between these provinces, leading to rapid traffic growth on this road. The estimated traffic use of the Cao Lanh and Vam Cong bridges in 2020 are 50% and 28% higher than use of the ferries in 2017. The average trip time saving by motorcycles was significant at 31 minutes per trip, while other vehicle types (cars/vans, buses, and trucks) experienced an average saving of over 10 kilometres and greater than one hour per trip.

At the household level, the Cao Lanh Bridge was mainly used by Dong Thap residents for daily commutes, visiting friends, and to purchase of household utensils and production materials. The use of Cao Lanh Bridge by local households was high in 2019, yet it declined in 2021 due to the COVID-19 effects. The Cao Lanh and Vam Cong bridges were found to increase the employment rate and household income, especially for wage jobs and non-farm jobs, as those indicators increased proportionally to proximity to the bridges. Specifically, if the distance from households to the nearest bridge (either Cao Lanh or Vam Cong) decreased by 10%, the working probability of the household members would increase by 0.5%, leading to an increase of household per capita income by VND 360 thousand or 1.4% compared to baseline. Non-farm income and wage income would increase by 7.7% and 4.1%, respectively, in this scenario. Impacts on education and healthcare were not noticeable, as schools and medical facilities were generally located within a shorter distance than the distance to the bridges.

Faster transport thanks to the bridges was converted into economic growth. Local transport operators claimed to benefit greatly from the projects, as shorter travel distances and travel times helped reduce costs per trip and increased the accuracy of travel time estimation and on-time delivery. The Cao Lanh Bridge removed the vehicle weight limit of the old ferry, thus, established a new route for traffic diversion from the My Thuan bridge on NH 1A and promoted freight transport by heavy trucks and articulated trucks in the region. These changes have stimulated the growth of local transport operators, generating employment opportunities in transport sector.

With local enterprises, mobility improvement has contributed to the reduction of delivery time of raw materials/finished goods and better accessibility to both input and output markets. As a result, some enterprises were spurred to increase the number of trips per truck per day, leading to the expansion of their production capacity to achieve economies of scale. There are initial signs that business are observing a reduction in transport costs, however the Project infrastructure may not have been in use long enough to have yet delivered a noticeable impact.

The long-term impacts of the Cao Lanh Bridge and the Connectivity Project are highlighted at the provincial and regional level. They have acted as a catalyst for Government investments in road transport infrastructure in the local area, including several road investments of Dong Thap and An Giang authorities to maximize the transport benefits of the Project, and a USD 6.5 billion's worth plan for expressway development in the Mekong Delta by the Ministry of Transport. The Project has made Dong Thap and An Giang more attractive to investors, which

has contributed in rapid investment growth in those provinces in 2018 and 2019. As the investment sectors focused on seafood and agricultural processing, tourism, and real estate, they are expected to benefit farmers and generate more employment opportunities for local workers. Further, numerous projects have been recently invested in by real estate giants in Vietnam such as Vingroup, FLC and T&T which will upgrade the capital cities of the two provinces. Finally, the Project has promoted local tourism, especially in Dong Thap, by providing the province with better connectivity to the neighbouring provinces and local airports. Sa Dec has reported to benefit greatly from this impact, and the Cao Lanh Bridge itself has been considered by tourists and local habitants as a sight to see.

The Benefit-Cost Analysis shows that the Cao Lanh Bridge had brought economic benefit double that of the initial; project investment. The Net Present Value of the Bridge was estimated to be USD 194.1 million at the 7% discount rate and the EIRR was estimated at 12.5%. The NPV of the whole Connectivity Project was estimated to be USD 532.7 million with an EIRR of 13.6%.

In summary, the Cao Lanh Bridge is a successful investment as the Bridge and the Connectivity Project have become an invaluable asset of Dong Thap and the Central Mekong Delta. The Cao Lanh Bridge has proven to positively impact the daily commute of local people. The Projects benefits to regional transport will improve significantly once the connecting expressways Cao Lanh – An Huu and Cao Lanh – My An are completed. These expressways will provide a direct link from Ho Chi Minh City to Dong Thap and the Central Mekong Delta and maximize the use of the Cao Lanh Bridge. In the longer term, investment opportunities and economic growth in the area will drive demand for skilled labor. Thus, promotion of vocational training to equip local workers, particularly female, with the necessary skills to take advantage of employment opportunities to improve income and livelihoods. A follow-up survey is recommended in the next five years to, post COVID-19 containment and completion of the expressway to provide a full evaluation of the Cao Lanh Bridge.

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6 Appendix A: Survey Tools

Please refer to following links for surveyed tools that were used for the endline impact evaluation:

- **Quantitative Questionnaires:**
 - For household:
<https://drive.google.com/file/d/1MDG8ebctOk9gaiNaTBfzRSqgEt5tJ2c3/view?usp=sharing>
 - For commune:
https://drive.google.com/file/d/1Lxp2HTMnANhScfpTc2YYKb9PQXUU7_fl/view?usp=sharing
- **Qualitative Interview Guides:**
 - For transport operator:
<https://drive.google.com/file/d/1M0FRPxdRtIB37mRfLY9nx93RsXCDzeKW/view?usp=sharing>
 - For business in industrial park:
<https://drive.google.com/file/d/1M4ypA2VbDTtTS9luvr9EHpKhystju9Vq/view?usp=sharing>
 - For Economic Zone Authority and Social Economic Department:
<https://drive.google.com/file/d/1M5ZW7L3HD3boiaybNPYzvVg5XcmoMry1/view?usp=sharing>



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