JICA Research Institute

JICA-RI Working Paper

Empirical Study of Impact of Infrastructure Building in Southern Africa

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No. 74

March 2014

JICA Research Institute

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Effects of Transport Corridor Development on Firms' Locational Choice and Firms' Perception of Business Environment: A Preliminary Analysis of Transport Corridors in Mozambique

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Abstract

This paper aims to conduct a preliminary analysis of the expected effects of a transport infrastructure project on firms' locational choice and business environment in Mozambique, using a baseline firm survey. We compare firms' locational choice factors and their perceptions of the business environment between the underdeveloped Nacala corridor, where a road improvement project is being implemented, and the well-developed Beira corridor as a comparator. On the firms' locational choice, we find a statistically significant difference between the two corridors, after controlling for firms' characteristics. While the firms emphasize closeness to customers in the Beira corridor, the firms emphasize better infrastructure in the Nacala corridor. We also find statistically significant differences in some business environment factors between the two corridors. In the Nacala corridor, the firms consider transport infrastructure to be problematic for operation and growth. In the Beira corridor, the firms believe some factors related to government administration and regulations are obstacles. These results are still preliminary. At this stage of our research, we can only point out the possibility that the conditions of transport infrastructure may affect private firms' self-evaluation of their locational choice and their business environment.

Keywords: Transport infrastructure, Locational choice, Business environment, Impact analysis, Mozambique

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This study was initiated by Ms. Megumi Muto and Ms. Shinobu Shimokoshi, former JICA Research Institute in 2008. We extend sincere thanks to Mr. Keiichi Tsunekawa, Dr. Naohiro Kitano, and two anonymous reviewers for their valuable comments, though we sorely are responsible for any errors and inaccuracies.

1. Introduction

There is a general consensus that infrastructure[1] is necessary – but, not necessarily sufficient – for economic growth and poverty reduction in developing countries in a number of studies (for example, Calderón and Servén 2010). Among various infrastructure developments, road improvement is expected to enhance the time-efficiency and cost-efficiency of transport of inputs and outputs in undeveloped areas where traffic congestion is not yet a concern, resulting in the rise of productivity of firms along the road.Where to construct infrastructure is a critical issue for ensuring the effectiveness of infrastructure investment (Estache and Fay 2010; World Bank 2008, 230-231).

In Africa, it is more important to benefit from agglomeration economies and economies of scale through regional integration for reducing the unit cost of infrastructure investment because Africa's population and industries are more dispersed and countries are more divided than other parts of the world (Foster and Briceno-Garmendia 2009, 20-23). Recently, African countries have been more active in developing international transport corridors for connecting land-locked countries, urban areas, growth poles, and seaports along trunk roads (PIDA 2012).

In northern Mozambique, the paving of the national roads along the Nacala corridor is expected to bring drastic change in connectivity not only within the area but also in neighboring countries, Malawi and Zambia. JICA assists with the development of the Nacala corridor including the paving of national roads and port development through official development assistance (ODA) together with other donors including African Development Bank.

This paper aims to conduct a preliminary analysis on firms' locational choice and their perception of the business environment along the Nacala corridor in comparison with those along the Beira corridor, which is an established international logistics route thanks to its better

[1] In this paper, infrastructure includes transport (roads, airports, seaports and railways), electricity (generation, transmission and distribution), information and communication, and water and sanitation. This paper deals with only roads.

road condition and developed Beira port (see Appendix 1). We use part of the data collected in JICA's firm survey of early 2009. We pose the following two specific research questions: first, what are the differences in locational decision factors between Nacala corridor and Beira corridor firms? Second, what are the differences between firms' assessment of the business environment between the two corridors? This second question is important and complementary to the first because firms take into account the business environment in their locational choice.

The significance of this paper is twofold: first, this paper uses firm-level survey data, which is scarce in Mozambique, apart from the World Bank's investment climate assessment in 2009 (World Bank 2009). Second, the paper compares two locations with different road infrastructure conditions and can contribute to studying the importance of infrastructure investment[2].

Nevertheless, there are limitations in the present paper. First, the data is one-time cross-sectional data. It is impossible to establish causal relations between the road project on the one hand and firms' locational decision and their perceptions on business environment on the other. We can only see their correlations and tendencies at this stage. To more rigorously understand the impact of the road project, it is necessary to conduct a difference-in-difference analysis with regard to both time and places. Second, the firm survey offers only scarce information on firms' financial and production performance (revenue, profit, quantity of inputs, etc.)[3]. Third, there is a limitation inherent to the nature of a survey that covers only the firms that are already located in the survey areas and does not include businesses that are considering their

[2] Ultimately, we hope to make the following contributions: first, the study quantitatively assesses the impact of the road improvement project in view of the growing interest in aid effectiveness. Second, it contributes to academic research on economic geography and public investment as to firms' locational choice in developing countries particularly in Africa. However, it is not possible for now because of the reasons mentioned in the next paragraph.

[3] For example, some respondents were reluctant to answer questions on revenue and profit because of the concern that their answers might be used by the tax authorities; and others did not keep their records. Also, some parts of the survey questionnaire might have been too detailed and complex for some respondents to answer properly.

location in the near future. The first limitation needs to be addressed by an after-project survey. Furthermore, such project should be designed to deal with the second problem.

The rest of this paper is organized as follows: section 2 reviews the relevant literature of the firms' locational choice. Section 3 explains the JICA project, and the current situation of the Nacala and Beira corridors. Section 4 presents the analytical framework. Section 5 explains the firms' survey data, and presents the summary statistics. Chapter 6 shows the results of our econometric analysis, and discusses the results. Chapter 7 presents preliminary conclusions.

2. Literature review

The present paper contains the two closely related pillars: firms' locational choice and firms' perception of the business environment. In general, firms choose their location in order to maximize their profits. A certain amount of theoretical literature argues that the transport cost to access market and inputs, land rent, input prices, wages, economies of scale, agglomeration economies, etc., influence firm productivity, and hence their locational decision (Fujita and Thisse 2002; Duranton and Puga 2004; Kuroda et al. 2008; O'Sullivan 2012; etc.).

There are several indicators on the quality and development of infrastructure at the country level such as the Global Competitive Index (GCI) of the World Economic Forum (WEF) and World Development Indicators (WDI) of the World Bank. However, there is little empirical research based on firm-level data on the role of transport infrastructure for firms' location choice. Some of the exceptions are the analysis by Deichmann, et al. (2005) that uses firm-level data in Indonesia and illustrates the potential effects of transport improvements on the relocation of manufacturing firms. They find that while agglomeration economies are important in explaining the distribution of manufacturing activity, improvements in transport infrastructure may have only limited effects in attracting industry to lagging regions. They suggest that other forms of public service provision and amenity creation are necessary.

There is some empirical evidence on the role of transport infrastructure in advanced economies; Dorantes et al. (2011) employ a multinomial logit model and assess economic impacts of the metro line expansion on industrial locational patterns in the suburbs of Madrid. Their results indicate that the locational pattern of economic activities is related to urban accessibility and agglomeration. Results of the impact of road infrastructure on firm locational decisions are mixed. On the one hand, Holl (2003) argues that access to road transport infrastructure plays an important role in manufacturing plant location in Spain, while Bryan et al. (1997) find that the economic benefits of new road infrastructure are modest; it plays only a partial role in improving the economic prospects of peripheral areas, and must be supplemented by other policy measures.

There is some empirical evidence that identifies the factors influencing firm locational decision making but is not limited to infrastructure improvement. Lall et al. (2009) employ a conditional logit model to estimate the location decisions of new manufacturing firms established from 2002 to 2003 in Ghana using the data from National Industrial Censuses. They find that the proximity to markets, agglomeration economies, local education levels and local economic size increase the attractiveness of a district and have a positive effect on firms' location decisions.

Another approach is the firm survey such as the investment climate survey, though the interpretation of subjective responses is not easy because the responses can be influenced by the needs and expectations of local businesses (Deichmann et al. 2008). Most studies using the investment climate survey try to relate investment climate constraints to firm performance and development, and there is almost no evidence on how infrastructure development affects firms' perceptions of the business environment. World Bank (2009) examines the correlation between investment climate assessment variables, firm-specific characteristics and firm performance, using the investment climate survey of 2008 in Mozambique (the observations: 554 firms in the four major cities of Maputo, Beira, Matola and Nampula). They find that the poor

infrastructure is correlated with lower firm productivity; that the access to finance has a positive effect on firm productivity measured by sales and value-added per worker; and that the regional disparities in firm performance are significant. Aterido et al. (2009), and Aterido and Hallward-Driemeier (2010) examine how different dimensions of the investment climate affect patterns of employment growth in Sub-Saharan Africa. They find that the poor quality of infrastructure (electricity and transportation) slows growth of medium-sized and large firms, but not of small or microenterprises.

There is still debate on firms' locational choice, and additional empirical research will be useful to advance the discussion, particularly on Africa. It is worthwhile studying the impact of the corridor development projects actively pursued by African countries. In this paper, we present the results of a preliminary analysis of the baseline firm survey conducted in 2009 in Mozambique and try to address the issue on which empirical evidence is very scarce: how transport infrastructure and transport policies can affect the geography of businesses and economic activity.

3. The project and the situation in the Nacala and Beira corridors

The project

Mozambique is located along the coast and has the three major seaports of Maputo, Beira and Nacala acting as gateways for the rest of the country and the nearby landlocked countries (Appendix 1). The international transport corridors connecting these ports to the landlocked countries (Zimbabwe, Zambia and Malawi, Swaziland, and Botswana) have played important roles in facilitating export/import of goods including mineral resources. The Maputo corridor (Maputo port – South Africa – Botswana), and the Beira corridor (Beira port – Zimbabwe – Zambia) are already functioning as major international logistics routes.

However, the Nacala corridor (Nacala port – Malawi – Zambia) located in the northern part of the country is underdeveloped. The national roads No. 1, No. 12 and No. 13 (with a total length of approximately 700km) connect the Nacala port to Mandimba (a border town with Malawi) through Nampula City. While approximately 200km (Nacala port to Nampula City) is already paved, the section from Nampula City to the west (including Nampula City – the Mandimba section in Mozambique) needs to be paved. Table 1 shows road length (km) by road classification and road conditions in Mozambique. The proportion of paved primary roads[4] in Niassa and Nampula provinces (classified as "Nacala" in the table) is less than 50 percent, while the proportion in Sofala, Tete and Manica provinces (classified as "Beira") is almost 100 percent. It is obvious that primary roads in Nacala are underdeveloped compared with other provinces. As a result, the Nacala port, a natural deep seaport, is also underdeveloped compared with the Maputo and Beira ports. The Beira port deals with approximately 3 times more freight, particularly international, than the Nacala port (Table 2).

JICA has been assisting and plans to enhance its assistance to infrastructure development in the Nacala corridor through port development, road improvement, and bridge construction projects. The Nampula-Cuamba Road Upgrading Project, the main target of this paper, aims at improving the 350-kilometer national road between Nampula City and Cuamba (the construction period: 2010-2014). In addition, Cuamba – Mandimba will be paved using a loan from the African Development Bank (the construction period: 2015-2018). The project is expected to have a positive impact on the distribution of goods in northern Mozambique, the activation of regional economies, the improvement of livelihoods of residents, and the alleviation of poverty.

[4] Primary roads are classified as national roads with secondary roads. They link provincial capitals and other cities, main ports and important border posts. As for secondary, tertiary and vicinal roads, a large proportion are unpaved and there are no significant differences between Nacala and Beira.

Population and firms along Nacala and Beira corridors

Table 3 and Figure 1, based on the published statistics of the government of Mozambique[5], show the district-wise distribution of population and employees of registered firms along the corridors in 2008. Along the Nacala corridor, Nampula City is the largest in population, followed by the Manapo district and the Nacala Porto district. Along the Beira corridor, Beira City is the largest in terms of population, followed by the Gondora district, and Chimoio City.

The industries (measured by the number of employees of registered firms) are more concentrated in the limited number of cities/districts than the population (see the right top panel of Figure 1). Beira City has the largest concentration of industries along both corridors. Along the Beira corridor, the industries are a little more dispersed between Beira City and the Manica district. In the Nacala corridor, however, the industries are concentrated in Nampula City and only a small number of industries are located in other districts/cities. This suggests that firms are more agglomerated along the Beira corridor than along the Nacala corridor.

4. Analytical framework

We only have the before-project single cross-section data. At this stage, therefore, we can only compare the firms along the Beira corridor and those along the Nacala corridor at the time of the 2009 survey. Through this comparison, we aim to understand the differences in their location decision factors and their perceptions on the business environment.

Model 1: Locational choice factors

First, we examine the determinants of firms' location decisions paying special attention to road connectivity. In our firm questionnaire survey, we asked the reasons why the firms chose the

[5] Nampula City is the capital of Nampula Province and has a population of 471,717 (2008), the second largest city after the country's capital, Maputo (1,128,571 in 2008). Beira is the capital city of Sofala Province and the third largest city with a population of 431,583 (2008).

place of their main operating facilities. The surveyed firms were requested to choose the most important reason among the thirteen (13) factors including "near customers," "better infrastructure (road, electricity, etc.), "availability of land," and "potential market" (Table 5). It is interesting to know on which factors firms located in established and non-established corridors place most importance.

The estimation method most suitable for this specific question in the questionnaire is the multi-nominal probit regression because the respondents are requested to make only one choice among the 13 factors. Because of the limited sample size, however, we use the probit regression for a dichotomous dependent variable, as follows:

$$
\begin{aligned}
y_i^* &= \alpha + \beta_1 \, Beira\_dummy + \boldsymbol{x\delta} + u_i \\
y_i &= 0 \quad (if\, y_i^* \leqq 0);\ or \\
y_i &= 1 \quad otherwise.
\end{aligned}
\tag{1}
$$

y_i^* is a latent variable. *Beira_dummy* indicates various location-specific factors of the Beira corridor. $\boldsymbol{x\delta}$ denotes characteristics of individual firms and managers and control for other factors affecting the latent variable. The variable of our primary interest in this model is *Beira_dummy.*

However, we have to be careful in interpreting Beira_dummy, which represents a number of observed/unobserved differences between the two corridors. They may include differences of industrial agglomeration, business environment, and infrastructure. The difference in the infrastructure is only one of many differences between the two. Therefore, it is important that we should not easily attribute any difference to the difference of the infrastructure

between the two corridors. Because we only have the one-time cross-sectional data, we cannot separate the effect of the infrastructure, and other Beira corridor-specific factors[6].

Model 2: Business environmental factors

Second, we analyze how various business environmental factors, including infrastructure, affects their business operations. The firms were asked to judge whether or not twenty (20) business environmental factors are problematic for the operation and growth of their business by putting "0 – no obstacles", "1 – slight", "2 – moderate", "3 – major", "4 – serious obstacles" or "not applicable" with respect to each factor. The ordered probit regression is suitable for analyzing the answers to this type of question, as follows:

$$
\begin{aligned}
y_i^* &= \alpha + \beta_1 \, Beira\_dummy + \boldsymbol{x\delta} + u_i \\
y_i &= 0 \quad if\, y_i^* \leqq 0; \\
y_i &= 1 \quad if\, 0 < y_i^* \leqq \mu_1; \\
y_i &= 2 \quad if\, \mu_1 < y_i^* \leqq \mu_2; \\
y_i &= 3 \quad if\, \mu_2 < y_i^* \leqq \mu_3; or \\
y_i &= 4 \quad if\, y_i^* > \mu_3. \qquad (2)
\end{aligned}
$$

μ_i denotes cut points for the latent variable to determine y_i. Similar to the model 1, our primary interest variable in this model is *Beira_dummy*. We have the same constraints in interpreting the implication of *Beira_dummy* as model 1. When there is any difference in firm perception on a business environment factor, the difference comes from not only the infrastructure but also many differences between the two corridors

[6] We considered including variables to control for road transport conditions of each firm, and road transport conditions of the relevant provinces, districts, and cities. The former is partly done by including client structure. The latter was not possible due to non-availability of road-related data suitable for this analysis. For example, the road paving ratios of national roads can be computed by province. However, the province-wise paving ratios are correlated with *Beira_dummy* since Beira corridor passes through three provinces, and Nacala corridor is in two provinces.

5. The data and summary statistics

The data

The firm survey was conducted in January – February 2009 for a total of 340 firms clustered in Nacala Porto, Nampula, Ribaue, and Cuamba along the Nacala corridor, and Tete, Chimoio, and Beira along the Beira corridor (see Appendix 1 for the locations of these cities and districts). In this analysis, the firms along the Beira corridor are the treatment group (with a paved corridor road) and the firms along the Nacala corridor are the control group (without a paved corridor road).

Initially, based on the 2002 Firms Census list provided by the Mozambique National Institute of Statistics (INE), we determined the sample size as 315, and conducted stratified sampling by organizing firms by the above area clusters, industrial sectors (agriculture, manufacture, and service), and by the three size categories (by the total number of employees ranging from 6 to 9, 10 to 49 and more than 50). All of the 215 firms in the agricultural and manufacturing sectors were to be interviewed, and 100 service-sector firms were selected randomly from the list.

However, as we found serious discrepancies between the list of the 315 firms and the actual situation, the survey team chose new firms on a random basis when they could not find out firms listed in the 315-firm list. As a result, the survey team interviewed a total of 340 firms including firms whose number of employees is below six.

Summary statistics of the surveyed firms and firm managers

Table 4 shows the characteristics of the surveyed firms. In this paper, we use the survey results of the 338 firms by removing two outliers. There are a total of the 338 surveyed firms, which accounts for 225 firms (75%) along the Beira corridor, and 83 firms (25%) along the Nacala corridor. In terms of the industrial sectors, 45% of the firms belong to the manufacturing sector,

followed by the service sector with 41% and the agriculture sector with 15%. The proportion of the manufacturing sector is higher in Nacala corridor (57%), and 96% of the agricultural firms are located along the Beira corridor[1].

The following are the overview of characteristics of the surveyed firms with some highlights on the differences between the two corridors: the average number of workers of the 338 firms is 47.9; the figure is much higher in the Nacala corridor firms (97 persons) in comparison with the Beira corridor (32 persons). There are two reasons for this difference. First, the proportion of large firms (more than 50 workers) is higher in the Nacala corridor firms (22%) compared to 13% of the Beira corridor firms. Second, there are two very large firms[2] along the Nacala corridor. The average number of years since the establishment of the firms is 11.2 years; the firms along the Nacala corridor are almost two years older than those of the Beira corridor. The average number of products is 2.7; the number is slightly higher in the Nacala corridor. The average amount of investment per worker is 6,336 meticais (MT); that of Beira corridor firms is 6,775 MT and that of Nacala firms is 5,152 MT. Less than 2% of the total firms export or import goods and services. As for the marketing structure, the large proportion of firms in both corridors is concentrated in individual clients, which accounts for 68% and 62% in the Beira and Nacala corridors, respectively. Domestic-private sector firms are the second largest clients for firms in both corridors, while the state enterprises are the third largest. 62% of the companies delivered their products or services to the locality; the proportion is similar among the two corridors.

As for the characteristics of the firm managers, 88% of the firms are managed by Mozambican nationals; 87% of the managers are male; the average age is 41.3 years old; and their average years of experience is 12.8. There is not much difference in these characteristics

[1] There is a large disparity in the number of agricultural firms between the two corridors. In the INE 2002 firm list, there were a much smaller number of agricultural firms in the Nacala corridor (2 firms) than in the Beira corridor (60 firms).

[2] The numbers of workers of the two very large firms are 2,300 and 2,600, respectively.

of the managers between the two corridors. Regarding their ethnic origins, 62% of the managers are Makua along the Nacala corridor, while the proportion is distributed more widely in the Beira corridor, with Sena, at 24%, being the dominant group. As to the proportion of the highest educational level of the managers. the proportion of the high-school level is higher along the Beira corridor, while the proportion of the managers with university degrees is more or less the same in the two corridors. This indicates that the average educational level of the managers is slightly higher in Beira corridor firms.

Summary statistics of firm locational choice and business climate factors

Regarding the determinants of firms' location of their main operating facilities (Table 5), 43% of the all surveyed firms chose their location based on proximity to customers; better infrastructure is the second location driver with 15% of firms in total. There is a clear difference between the firms along the Beira corridor and those of the Nacala corridor. 50% of the Beira corridor firms placed the highest importance on "near customer", while 30% of Nacala corridor firms chose "better infrastructure" as the main location driver, followed by the proximity to customers with 22%. Since the Beira corridor is more developed than the Nacala corridor, there is a possibility that Nacala corridor firms paid greater attention to infrastructure when they chose their location.

Table 6 and Figure 2 show the summary statistics of firms' perceptions on business environmental factors. We find a general tendency that the firms in the Nacala corridor complain more frequently than the Beira counterparts that the infrastructure (transport, electricity and telecommunication) and the access to finance are problematic for their business. With regard to the factors related to government administration and regulations, and macroeconomic policy and stability, Beira corridor firms complain more than Nacala corridor firms.

6. The results and examination

Model 1: Locational choice factors

Tables 7 and 8 show the results of the probit model examining the determinants of location decision of the surveyed firms. We conduct two probit analyses, each of which examines firms that chose "near customer" or "better infrastructure" as the most important reason for their location decision. In each probit analysis, we test the statistical significance of the location difference of the Beira and Nacala corridors, while controlling for the characteristics of the firms and managers. We examine the 5 specifications for each probit model, with respect to differences in the characteristics of the firms and managers as control variables (see Tables 7 and 8, and Appendix 2 for the description of the explanatory variables).

Regarding the outcome variable "near customer," the results of all the specifications indicate that *Beira_dummy* is statistically significant at the 1% significance level, and its coefficients are all positive. The proximity to customers is the most important for the firms along the Beira corridor, even after controlling for the firm and manager characteristics. The *Manufacturing_dummy* and *Service_dummy* are statistically significant at the 1% significance level, and their coefficients are positive. This suggests that the industrial sectors of the firms are also correlated to firm locational choice. There are other statistically significant factors: *Investment to equipment per worker* in the specifications (4) and (5), and managers' education in the specifications (2) and (3).

The same probit analyses are conducted for the outcome variable "better infrastructure." The results of all the specifications show that *Beira_dummy* is statistically significant at the 1% level, and the coefficients are negative. This result indicates that the firms along the Nacala

corridor are in a higher probability to choose their location with "better infrastructure" than those along the Beira corridor. All the other explanatory variables are not statistically significant.[3]

According to these analyses, the firms along the Beira corridor consider the closeness to customers as the most important factor in their locational choice while the firms along the Nacala corridor consider that the better infrastructure is the most important. Because *Beira_dummy* can represent a variety of differences between the two corridors, at this stage it is difficult to separate the effect of infrastructure development and the degree of the agglomeration of firms and population.

Model 2: Business environmental factors

Next, we conduct ordered probit analyses to test the differences of firms' perceptions on the 20 business environment factors between the Beira and Nacala corridors.

We first conduct the ordered probit regression of all the 20 factors only on *Beira_dummy*. The following eight factors are statistically significant below the 5% significance level: (i) transportation; (ii) customs and trade regulation administration; (iii) business licensing and registration; (iv) labor regulations; (v) economic policy uncertainty; (vi) macroeconomic instability; (vii) anti-competitive practices; and (viii) competition from illegal imports/contraband. In addition, the following two factors – telecommunications, and tax administration – are marginally significant (at the 10% level). We test the significance of *Beira_dummy* in terms of these total 10 factors, while controlling for the firm and manager characteristics (Table 9 (1) and (2)).

First, we look at the results of the analysis of the infrastructure factors, i.e., "telecommunications" and "transportation." Regarding "transportation," *Beira_dummy* is statistically significant at the 1% significance level, and its coefficient is negative. This is

[3] Although we tested the specifications (4) and (5) as in the analysis of "near customer," they are not statistically significant as a model. Therefore, we do not include the results of the specifications (4) and (5) in Table 6.

consistent with the poorer road condition of the Nacala corridor. Regarding "telecommunications," however, *Beira_dummy* is not significant, but, rather *Log of the number of employees* is significant and its coefficient is positive. This indicates that the size of firms matters more than the firm location in firms' evaluation of telecommunication conditions.

Second, we look at the factors related to government administration and regulations – "tax administration;" "customs and trade regulation administration;" "labor regulations;" and "business licensing and registration." For "customs and trade regulation administration" and "labor regulations," *Beira_dummy* and *Technology_dummy* are significant below the 5% level, and their coefficients are positive. For "tax administration" and "business licensing and registration," *Beira_dummy* is only marginally significant (i.e., at the 10% level). Rather, *Technology_dummy* is significant at the 5% significance level and its coefficient is positive for both factors. This result implies that the firms active in their business expansion through the introduction of new technologies tend to regard government administration and regulations as obstacles for their business, regardless of their locations.

Third, we look at the results of macroeconomic aspects – "economic policy uncertainty (unpredictability of policies)" and "macroeconomic instability (inflation and exchange rate)." For both factors, *Beira_dummy* is significant at the 1% level and its coefficient is positive. In addition, *Manufacturing_dummy, Order_share_dummy,* and *Technology_dummy* are significant, though *Technology_dummy* is not significant in "macroeconomic instability (inflation and exchange rate)." A possible explanation is as follows: manufacturers may be easily affected by macroeconomic factors because they need physical capital; firms that share orders with other firms would feel a greater risk if orders are suddenly reduced by economic instability; the firms may be afraid that newly introduced technology becomes idle due to economic fluctuations.

Fourth, the last two factors are concerned with competitive practices related to government administration and regulations: "anti-competitive practices (e.g., monopoly)" and "competition from illegal imports/contraband." For both factors, *Beira_dummy* is statistically

significant at the 5% level, and its coefficient is positive. However, statistically significant firm characteristics are different. For "anti-competitive practices," *Manufacturing_dummy* and *Order_share_dummy* are statistically significant, and their coefficients are positive. Manufacturing firms and firms sharing orders with other firms may consider anti-competitive practices more problematic. On the other hand, *Number of products* is statistically significant and its coefficient is negative, which indicates that firms dealing with more products can be less affected by anticompetitive practices. For "competition from illegal imports/contraband," *Year*, *Order_share_dummy* and *Technology_dummy* are statistically significant and their coefficients are positive, suggesting that older firms and firms that are more active with new technology and have networks with other firms are negatively affected by illegal imports. *Log of number of workers* is statistically significant and its coefficient is negative probably because the larger firms are more resilient to illegal imports due to their size.

There are clear differences of perceptions of most of the business environmental factors between the firms located in the Nacala and Beira corridors. This is because the Beira corridor is more developed, more closely connected to the international market, more competitive (whether legal or illegal), and more regulated by the government than the Nacala corridor.

7. Preliminary conclusions

On the basis of the above analysis and discussions, this paper presents the following points as our preliminary conclusions while we recognize many limitations in our data. First, the firms along the Beira corridor consider the closeness to their customers as the most important in their locational choice while the firms along the Nacala corridor consider the better infrastructure is the most important. Because *Beira_dummy* represents a number of differences between the two

corridors, we cannot attribute this difference only to the infrastructure. To draw a clearer conclusion, we need after-project survey data.

Second, private firms in the two corridors have different perceptions of their business environment factors such as “transportation,” “customs and trade regulation administration,” “labor regulations,” “economic policy uncertainty,” “macroeconomic instability,” “anti-competitive practices,” and “competition from illegal imports/contraband.” The different view on “transportation” is probably due to the underdeveloped roads of the Nacala corridor. The other results may be partially explained by the fact that the Beira corridor is more agglomerated and connected to the international market than the Nacala corridor.

The implications of this second analysis are as follows. First, many Nacala corridor firms regard the transport infrastructure problematic; in this respect, there is a statistical difference between the two corridors. The government’s prioritization of transport investment in the Nacala corridor may therefore be justifiable. Second, Beira corridor firms regard government regulation and macro-economic policies as problematic. This is probably because (i) the Beira corridor is more developed; (ii) firms are more agglomerated in the Beira corridor; (iii) the economy of the Beira corridor is more open to the international market; (iv) the government regulations are stricter in the Beira corridor; and (v) Beira corridor firms have more needs and expectations (Deichmann et al. 2008). Nacala corridor firms may recognize similar obstacles once the Nacala corridor is developed. The government may therefore need to take preventive measures in parallel with the infrastructure development in the Nacala corridor. It is necessary for the government to improve, in the country as a whole, the factors that many firms think problematic.

Closing our discussion, we want to repeat that our data and analysis have many limitations and consequently our conclusions are very preliminary. We will conduct a full-scale study when the transport connectivity along the Nacala corridor is completed through the road paving and port development projects and an after-project survey is conducted.

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Table 1: Classification of road network per surface type (km)

	Province	Primary					Secondary					Tertiary+Vicinal				
		Paved	%	Unpaved	%	Total	Paved	%	Unpaved	%	Total	Paved	%	Unpaved	%	Total
Nacala	**Nampula**	483.7	49%	512.1	51%	995.8	0.0	0%	165.2	100%	165.2	19.5	1%	2,919.0	99%	2,938.5
	Niassa	282.9	42%	391.8	58%	674.7	78.1	23%	258.6	77%	336.6	93.9	4%	2,317.2	96%	2,411.1
Beira	**Sofala**	577.1	99%	7.4	1%	584.5	3.5	1%	550.4	99%	553.9	0.0	0%	1,236.8	100%	1,236.8
	Tete	529.6	100%	0.0	0%	529.6	280.1	24%	905.8	76%	1,185.9	16.6	1%	1,198.0	99%	1,214.6
	Manica	513.0	100%	0.0	0%	513.0	49.7	15%	286.5	85%	336.2	0.0	0%	1,561.8	100%	1,561.8
	Maputo	312.5	99%	2.5	1%	315.1	47.1	28%	122.0	72%	169.2	82.6	8%	966.9	92%	1,049.4
	Gaza	274.0	99%	1.8	1%	275.8	60.9	9%	629.3	91%	690.2	177.4	11%	1,383.6	89%	1,561.0
	Inhambane	557.9	100%	0.0	0%	557.9	59.4	22%	205.9	78%	265.3	4.6	0%	2,065.8	100%	2,070.4
	Zambezia	710.8	71%	289.9	29%	1,000.7	9.0	1%	689.4	99%	698.4	29.3	1%	2,485.9	99%	2,515.3
	Cabo Delgado	278.3	67%	135.8	33%	414.0	221.0	56%	170.6	44%	391.5	121.9	6%	1,869.1	94%	1,991.0
	Total	4,519.9	77%	1,341.2	23%	5,861.1	808.6	17%	3,983.8	83%	4,792.4	545.8	3%	18,004.1	97%	18,549.9

Source: ANE 2004

Table 2: Total throughput of Beira and Nacala ports (1,000 tons)

		2002	2003	2004	2005	2006
Beira Port	Domestic	74.3	44.1	60.5	38.5	30.1
	International	2,687.5	2,464.2	2,214.7	2,416.8	2,586.0
	Total	2,761.8	2,508.3	2,275.2	2,455.3	2,616.1
Nacala Port	Domestic	111.1	106.9	94.5	72.6	78.4
	International	662.9	668.3	803.5	797.6	852.5
	Total	774.0	775.2	898.0	870.2	930.9

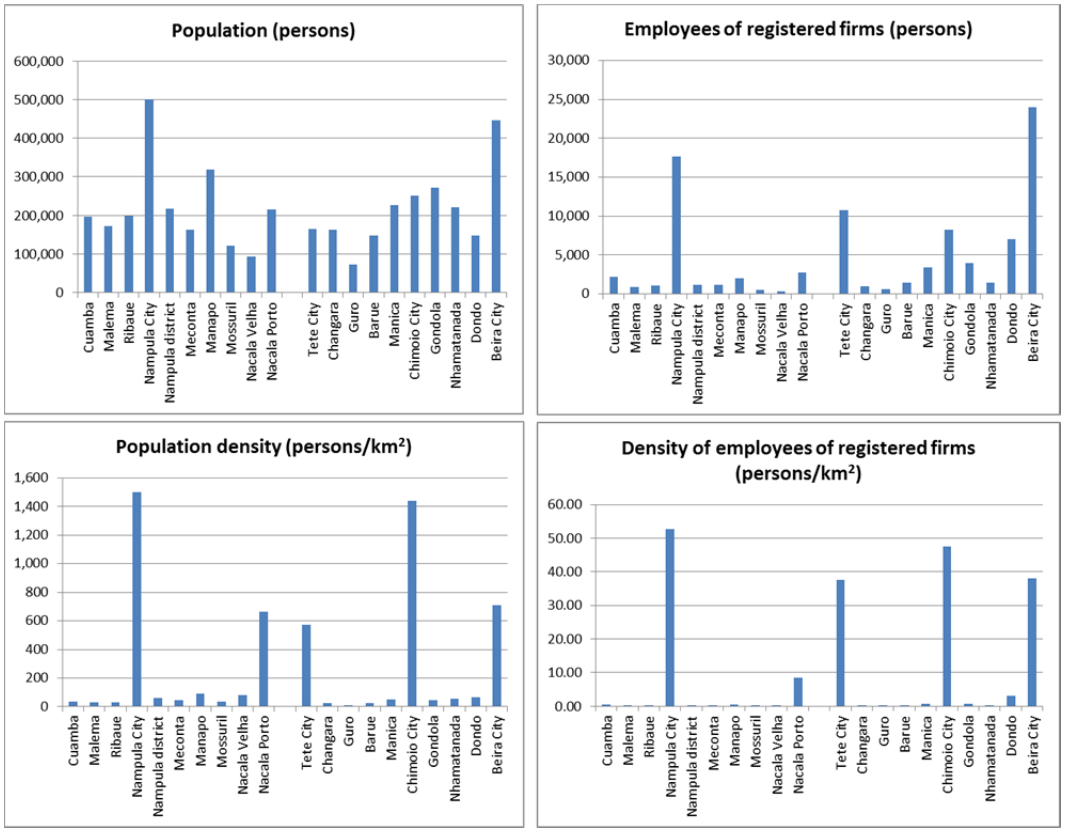
Source: www.pmaesa.org/mozambique and MOTC

Table 3: Population and industries along the Nacala and Beira corridors (2008)

	Cities and districts	Area (km^2)	Population (persons)	Population density (persons/km^2)	Employees of registered firms (persons)	Density of employees of registered firms (persons/km^2)
Nacala Corridor	Cuamba	5,359	197,389	37	2,208	0.41
	Malema	6,082	172,424	28	858	0.14
	Ribaue	6,292	197,560	31	1,034	0.16
	Nampula City	334	500,838	1,500	17,627	52.78
	Nampula district	3,698	216,973	59	1,202	0.33
	Meconta	3,721	162,450	44	1,213	0.33
	Manapo	3,564	319,226	90	1,968	0.55
	Mossuril	3,433	121,654	35	552	0.16
	Nacala Velha	1,151	93,557	81	380	0.33
	Nacala Porto	324	215,937	666	2,775	8.56
Beira Corridor	Tete City	287	164,093	572	10,769	37.52
	Changara	6,612	163,384	25	1,004	0.15
	Guro	6,925	72,352	10	649	0.09
	Barue	5,770	148,246	26	1,419	0.25
	Manica	4,383	226,600	52	3,377	0.77
	Chimoio City	174	250,145	1,438	8,257	47.45
	Gondola	5,766	272,396	47	4,008	0.70
	Nhamatanada	4,014	221,033	55	1,459	0.36
	Dondo	2,308	147,922	64	7,083	3.07
	Beira City	631	446,458	708	24,035	38.09

Source: INE 2011

Figure 1: Distribution of population and industries along the Nacala and Beira corridors (2008)



Source: INE 2011

Note: In each panel, the left half is for the Nacala corridor, and the right half is for the Beira corridor.

Table 4: Summary statistics of explanatory variables

	No. of observations	All	std. %[a]	Beira	std. %[a]	Nacala	std. %[a]
Total number of surveyed firms		338	100%	255	75%	83	25%
Characteristics of firms							
Industry sector							
Manufacturing		151	45%	104	41%	47	57%
Service	-	137	41%	103	40%	34	41%
Agriculture		50	15%	48	19%	2	2%
Total		338	100%	255	100%	83	100%
Number of workers	336	47.9	202.6	32.0	80.0	97.0	382.7
Size							
Small (1-9)		174	52%	135	53%	39	48%
Medium (10-49)	-	112	33%	87	34%	25	30%
Large (50 +)		50	15%	32	13%	18	22%
Total		336	100%	254	100%	82	100%
Number of years since establishment	336	11.2	10.7	10.7	9.9	12.7	12.6
Number of products	325	2.7	2.4	2.6	2.4	3.2	2.1
Investment in equipment per worker (MT)	218	6,336	18,607	6,775	20,978	5,152	9,725
Number of firms to introduce new technology	327	78	23%	59	23%	19	23%
Number of fimrs to share orders with other enterprises	324	65	19%	48	19%	17	20%
Number of firms to start producing for direct export	338	5	1%	4	2%	1	1%
Number of firms to start direct import	338	8	2%	7	3%	1	1%
Number of firms privatized before	338	19	6%	17	7%	2	2%
Share of sales to following client (%):							
Individual people	214	67%		68%		62%	
Domestic, non-state enterprises	52	16%		16%		17%	
State enterprises	30	9%	-	8%	-	11%	-
Non-commercial government authorities	12	4%		3%		6%	
Export	8	3%		3%		1%	
Other	4	1%		1%		3%	
Share of place and how products or services were delivered (%)							
Products or services delivered to the locality	121	62%		59%		72%	
Products or services delivered to the post administrative	9	5%		6%		1%	
Products or services delivered to the district	16	8%		7%		13%	
Products or services delivered to the province	20	10%	-	11%	-	8%	-
Products or services delivered to Mozambique	10	5%		6%		3%	
Products or services delivered abroad	7	4%		4%		2%	
Products or services delivered via distributor	12	6%		9%		0%	
Characteristics of general manager							
Age	335	41.3	11.8	40.8	11.7	43.0	11.8
Years of experience	335	12.8	10.3	12.4	10.3	13.9	10.1
Gender							
Male		290	87%	217	86%	73	89%
Female		45	13%	36	14%	9	11%
		335	100%	253	100%	82	100%
Number of managers who have management experience abroad	-	61	18%	41	16%	20	24%
Highest educational level							
University degree		37	11%	28	11%	9	11%
High-school (non-vocational and vocational)	-	107	32%	85	34%	22	27%
Secondary, primary, no education		190	57%	139	55%	51	62%
Total		334	100%	252	100%	82	100%
Nationality							
Mozambican	-	296	88%	226	89%	70	84%
Other		42	12%	29	11%	13	16%
Total		338	100%	255	100%	83	100%
Ethnic origin							
Makua		61	18%	10	4%	51	62%
Sena	-	61	18%	61	24%	0	0%
Other		213	64%	182	72%	31	38%
Total		335	100%	253	100%	82	100%

Note [a]: Figures with % in the colums of "std.%" indicate percentage. Otherwise standard deviation.

Source: Authors' calculation from JICA firm survey

Table 5: Summary statistics of outcome indicators (1): Reason for choosing firm's location

	All	%	Beira	%	Nacala	%
Total number of surveyed firms	338	100%	255	75%	83	25%
Near customers	145	43%	127	50%	18	22%
Better infrastructure (road, electricity)	51	15%	26	10%	25	30%
More information (price, technology)	1	0%	0	0%	1	1%
Rich skilled workers	3	1%	2	1%	1	1%
Affordable rent	8	2%	4	2%	4	5%
Allocated by the government	8	2%	7	3%	1	1%
Availability of land	26	8%	9	4%	17	21%
Potential market	28	8%	19	8%	9	11%
Availability of inputs	13	4%	12	5%	1	1%
Avoid local competition	7	2%	5	2%	2	2%
Favor local competition	7	2%	6	2%	1	1%
Supporting services	4	1%	4	2%	0	0%
Other	33	10%	31	12%	2	2%
Toal number of firms that answered	334	100%	252	100%	82	100%

Note: The question in the questionnaire: "Why did you choose this place (i.e. main operating facilities)?"

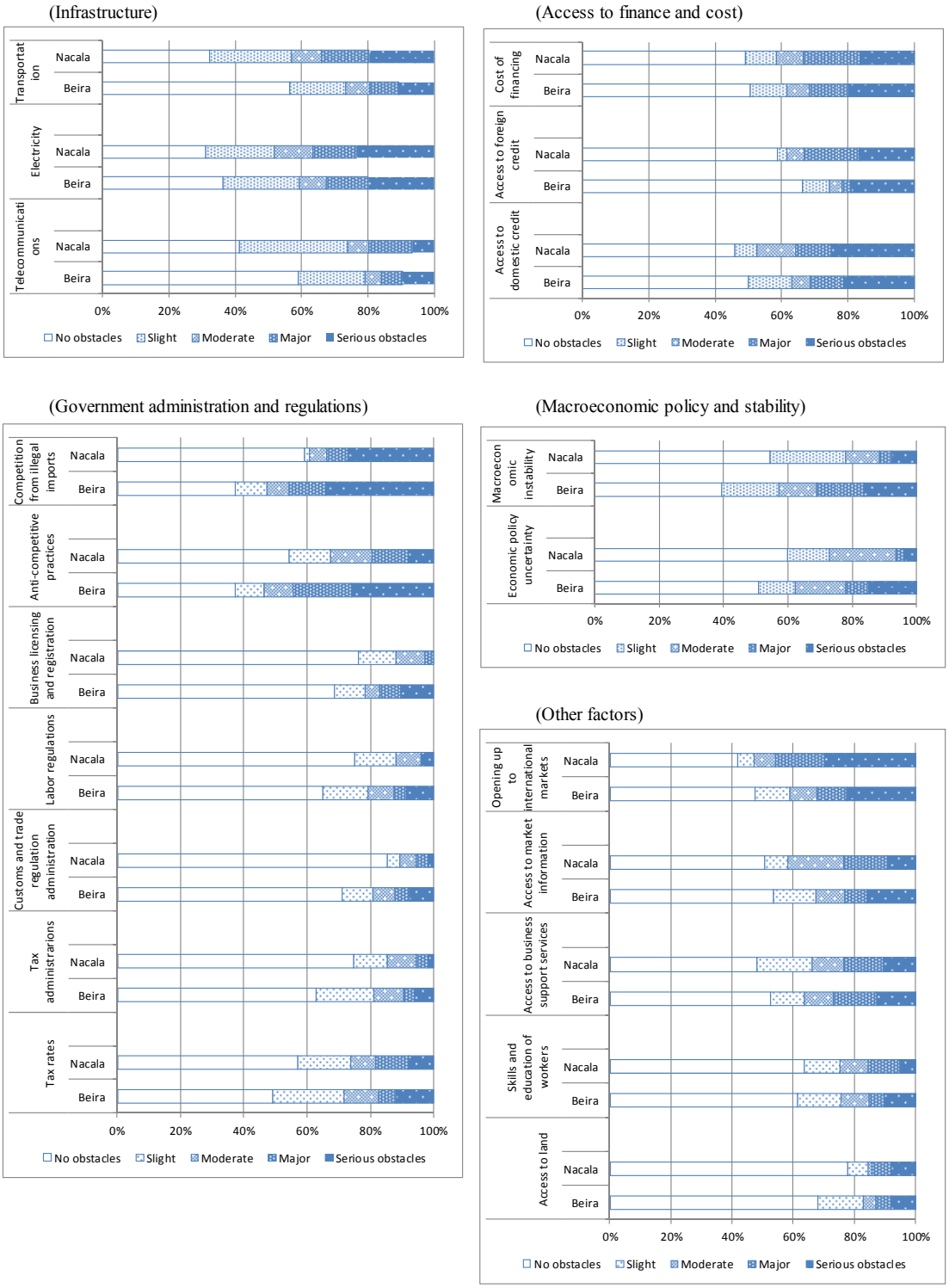
Source: Authors' calculation from JICA firm survey

Table 6: Summary statistics of outcome indicators (2): Business environmental factors

Outcome indicators		No obstacles	Slight	Moderate	Major	Serious obstacles	Total
Telecommunications	Beira	137	47	11	15	22	232
	Nacala	32	25	5	10	5	77
Electricity	Beira	84	53	19	29	46	231
	Nacala	24	16	9	10	18	77
Transportation	Beira	138	41	18	21	26	244
	Nacala	25	19	7	11	15	77
Access to land	Beira	163	35	10	12	19	239
	Nacala	60	5	1	5	6	77
Tax rates	Beira	117	53	26	13	28	237
	Nacala	44	13	6	8	6	77
Tax administrarions	Beira	148	43	22	8	14	235
	Nacala	57	8	7	3	1	76
Customs and trade regulation administration	Beira	153	21	15	10	16	215
	Nacala	65	3	4	3	1	76
Labor regulations	Beira	155	34	20	9	20	238
	Nacala	58	10	6	0	3	77
Skills and education of workers	Beira	147	34	22	12	24	239
	Nacala	49	9	7	8	4	77
Business licensing and registration	Beira	162	23	11	16	24	236
	Nacala	58	9	7	2	0	76
Access to domestic credit	Beira	107	28	12	22	45	214
	Nacala	35	5	9	8	19	76
Access to foreign credit	Beira	113	14	6	5	32	170
	Nacala	43	2	4	12	12	73
Cost of financing	Beira	109	24	14	26	42	215
	Nacala	37	7	6	13	12	75
Economic policy uncertainty	Beira	120	27	37	17	35	236
	Nacala	46	10	16	2	3	77
Macroeconomic instability	Beira	91	41	27	34	38	231
	Nacala	42	18	8	3	6	77
Anti-competitive practices	Beira	88	22	21	44	61	236
	Nacala	42	10	10	9	6	77
Access to business support services	Beira	122	26	22	33	29	232
	Nacala	37	14	8	10	8	77
Access to market information	Beira	125	33	22	17	37	234
	Nacala	39	6	14	11	7	77
Opening up to international markets	Beira	89	21	17	18	42	187
	Nacala	31	4	5	12	22	74
Competition from illegal imports	Beira	74	20	14	23	67	198
	Nacala	44	1	4	5	20	74

Source: Authors' calculation from JICA firm survey

Figure 2: Summary statistics of outcome variables (2): Business environmental factors



Source: Authors' calculation from JICA firm survey

Table 7: Results of probit analyses of locational decision factors (Near customers)

	Near customers				
	(1)	(2)	(3)	(4)	(5)
Beira_dummy	0.909***	1.011***	0.971***	1.018***	1.108***
	(0.187)	(0.188)	(0.192)	(0.223)	(0.232)
Service_dummy	1.221***	1.378***	1.452***	1.022***	1.238***
	(0.273)	(0.285)	(0.307)	(0.347)	(0.382)
Manufacturing_dummy	1.211***	1.235***	1.284***	1.120***	1.223***
	(0.264)	(0.260)	(0.277)	(0.325)	(0.341)
Year	0.00541	0.0037	0.00478	0.00282	0.00198
	(0.008)	(0.009)	(0.009)	(0.009)	(0.011)
Log of number of workers	-0.064	-0.0923	-0.0319	-0.0961	-0.1
	(0.068)	(0.066)	(0.073)	(0.088)	(0.098)
Number of products / services	-0.00915	-	-0.0179	0.0155	0.000262
	(0.032)	-	(0.033)	(0.040)	(0.041)
Share_order_dummy	-0.189	-	-0.172	-0.114	-0.0379
	(0.192)	-	(0.196)	(0.232)	(0.242)
Technology_dummy	0.0639	-	0.0488	-0.134	-0.143
	(0.184)	-	(0.186)	(0.225)	(0.229)
Percentage of individual people as sales clients	0.0056	-	0.00417	0.00111	-0.000563
	(0.004)	-	(0.005)	(0.006)	(0.006)
Percentage of domestic, non-state enterprises	0.00297	-	0.00273	0.00325	0.00286
as sales clients	(0.005)	-	(0.005)	(0.006)	(0.007)
Percentage of state enterprises as sales clients	0.00432	-	0.00348	-0.00113	-0.0018
	(0.005)	-	(0.005)	(0.007)	(0.007)
Investment in equipment per worker	-	-	-	-0.0000308***	-0.0000307***
	-	-	-	(0.000)	(0.000)
Female	-	-0.0134	-0.0958	-	-0.0685
	-	(0.221)	(0.234)	-	(0.338)
Manager_education_dummy1	-	-0.398*	-0.313	-	-0.452*
	-	(0.214)	(0.223)	-	(0.274)
Manager_education_dummy2	-	-0.388	-0.361	-	-0.303
	-	(0.238)	(0.252)	-	(0.304)
Manager_education_dummy3	-	-0.911***	-0.910***	-	-0.644
	-	(0.329)	(0.343)	-	(0.441)
Manager's age	-	-0.00847	-0.00863	-	-0.00617
	-	(0.007)	(0.008)	-	(0.009)
Manager's years of experience	-	0.00303	0.00428	-	0.00863
	-	(0.009)	(0.009)	-	(0.012)
Abroad_dummy	-	0.166	0.284	-	0.362
	-	(0.211)	(0.232)	-	(0.292)
Constant	-2.243***	-1.301***	-1.799***	-1.563**	-1.234
	(0.594)	(0.442)	(0.682)	(0.720)	(0.834)
Observations	314	335	313	212	211
LR chi-squared	52.87	65.45	60.5	47.13	52.47
Prob > chi-squared	0.000	0.000	0.000	0.000	0.000
Pseudo R-squared	0.123	0.143	0.141	0.161	0.18

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation from JICA firm survey

Table 8: Results of probit analyses of location decision factors (better infrastructure)

	Better infrastructure		
	(1)	(2)	(3)
Beira_dummy	-0.800***	-0.820***	-0.850***
	(0.200)	(0.196)	(0.208)
Service_dummy	-0.296	-0.316	-0.505
	(0.311)	(0.298)	(0.336)
Manufacturing_dummy	-0.233	-0.235	-0.29
	(0.302)	(0.283)	(0.312)
Year	-0.00597	0.00514	0.00325
	(0.009)	(0.009)	(0.010)
Log of number of workers	-0.00391	0.0755	-0.011
	(0.081)	(0.071)	(0.087)
Number of products / services	0.0262	-	0.0391
	(0.035)	-	(0.037)
Share_order_dummy	0.209	-	0.185
	(0.222)	-	(0.226)
Technology_dummy	0.0413	-	0.0686
	(0.217)	-	(0.224)
Percentage of individual people as sales clients	-0.00916**	-	-0.0102**
	(0.005)	-	(0.005)
Percentage of domestic, non-state enterprises	-0.00229	-	-0.0049
as sales clients	(0.005)	-	(0.005)
Percentage of state enterprises as sales clients	-0.00666	-	-0.00805
	(0.005)	-	(0.006)
Investment in equipment per worker	-	-	-
	-	-	-
Female	-	-0.0837	-0.0984
	-	(0.269)	(0.285)
Manager_education_dummy1	-	0.344	0.0808
	-	(0.256)	(0.280)
Manager_education_dummy2	-	0.432	0.374
	-	(0.281)	(0.302)
Manager_education_dummy3	-	0.251	0.0771
	-	(0.370)	(0.399)
Manager's age	-	0.000692	-0.0000348
	-	(0.009)	(0.009)
Manager's years of experience	-	-0.012	-0.0201*
	-	(0.011)	(0.012)
Abroad_dummy	-	-0.0151	-0.0465
	-	(0.245)	(0.278)
Constant	0.368	-0.617	0.627
	(0.622)	(0.515)	(0.780)
Observations	314	335	313
LR chi-squared	28.73	26.1	35.49
Prob > chi-squared	0.003	0.010	0.008
Pseudo R-squared	0.107	0.0913	0.132

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Although we conducted models (4) and (5) as in the analysis of "Near customer", they are not as statistically significant as the model as a whole.

Table 9 (1): Results of ordered probit analyses of business environmental factors

	Explained Variables				
	Tele-commnications	Transportation	Tax administration	Customs and trade regulation administration	Labor regulations
Beira_dummy	-0.215	-0.681***	0.459*	0.571**	0.463**
	(0.196)	(0.188)	(0.237)	(0.284)	(0.227)
Service_dummy	0.0179	0.0834	0.441	-0.166	-0.0943
	(0.301)	(0.306)	(0.349)	(0.398)	(0.332)
Manufacturing_dummy	-0.313	0.0578	-0.0369	-0.0908	0.00562
	(0.275)	(0.273)	(0.329)	(0.369)	(0.305)
Year	0.00888	-0.00244	0.00857	0.0146	0.0125
	(0.00853)	(0.00858)	(0.00971)	(0.01140)	(0.00906)
Log of number of workers	0.209**	0.0552	0.0406	0.0126	0.0535
	(0.0830)	(0.0827)	(0.0930)	(0.1070)	(0.0898)
Number of products / services	-0.0325	-0.0355	-0.00292	-0.0121	-0.0256
	(0.0384)	(0.0385)	(0.0431)	(0.0513)	(0.0439)
Share_order_dummy	0.0378	-0.0276	0.258	0.536**	0.157
	(0.208)	(0.203)	(0.217)	(0.250)	(0.224)
Technology_dummy	0.0193	0.148	0.631***	0.684***	0.718***
	(0.200)	(0.188)	(0.209)	(0.244)	(0.209)
Percentage of individual people as sales clients	-0.00221	0.00796	0.00143	-0.00243	0.00523
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Percentage of domestic, non-state enterprises as sales clients	-0.00216	0.0085	-0.00385	-0.00622	0.00227
	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)
Percentage of state enterprises as sales clients	0.00115	0.00319	-0.006	-0.00487	0.0036
	(0.006)	(0.006)	(0.007)	(0.008)	(0.006)
Investment in equipment per worker	0.00000676	0.00000572	0.00000165	0.00000773	-0.000000852
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.156	-0.640**	-0.286	-0.0912	0.0147
	(0.290)	(0.296)	(0.314)	(0.363)	(0.316)
Manager education_dummy1	-0.413	-0.28	-0.0307	0.246	-0.135
	(0.255)	(0.224)	(0.257)	(0.318)	(0.260)
Manager_education_dummy2	-0.179	-0.399	-0.0635	0.461	0.159
	(0.262)	(0.252)	(0.293)	(0.356)	(0.292)
Manager_education_dummy3	-0.00739	-0.712*	0.102	0.427	0.705*
	(0.340)	(0.365)	(0.403)	(0.456)	(0.374)
Manager's age	-0.00955	-0.0178**	-0.0127	-0.0156	-0.0169*
	(0.008)	(0.008)	(0.009)	(0.011)	(0.009)
Manager's years of experience	0.013	0.0155*	0.000203	-0.003	0.00364
	(0.009)	(0.009)	(0.012)	(0.014)	(0.011)
Abroad_dummy	0.303	-0.213	-0.713**	-0.226	-0.516*
	(0.235)	(0.243)	(0.300)	(0.338)	(0.289)
cut1	-0.216	-0.751	0.64	0.941	0.937
	(0.700)	(0.712)	(0.763)	(0.883)	(0.740)
cut2	0.706	-0.142	1.226	1.145	1.460*
	(0.701)	(0.712)	(0.766)	(0.884)	(0.746)
cut3	0.927	0.133	1.705**	1.539*	1.816**
	(0.703)	(0.712)	(0.771)	(0.889)	(0.750)
cut4	1.302*	0.52	1.983**	1.918**	1.974***
	(0.707)	(0.712)	(0.776)	(0.897)	(0.751)
Observations	203	210	203	189	204
LR chi-squared (18)	40.55	36.07	37.62	30.77	32.7
Prob > chi-squared	0.003	0.010	0.007	0.043	0.026
Pseudo R-squared	0.081	0.059	0.087	0.101	0.075

Notes: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation from JICA firm survey

Table 9 (2): Results of ordered probit analyses of business environmental factors

	Explained Variables				
	Business licensing and registration	Economic policy uncertainty	Macroeconomic instability	Anti-competitive practices	Competition from illegal import/ contraband
Beira_dummy	0.637**	0.527***	0.824***	0.911***	0.312
	(0.255)	(0.200)	(0.197)	(0.196)	(0.207)
Service_dummy	0.502	0.313	-0.0249	0.376	-0.1
	(0.357)	(0.314)	(0.300)	(0.304)	(0.345)
Manufacturing_dummy	0.0941	0.600**	0.211	0.460*	0.0209
	(0.327)	(0.290)	(0.278)	(0.278)	(0.324)
Year	-0.0133	0.0136	0.00192	0.00317	0.0177*
	(0.01210)	(0.00856)	(0.00849)	(0.00894)	(0.01070)
Log of number of workers	0.00704	-0.0771	-0.061	-0.0332	-0.199**
	(0.0964)	(0.0844)	(0.0823)	(0.0842)	(0.0909)
Number of products / services	-0.0648	-0.0408	-0.0256	-0.0572	-0.00913
	(0.0525)	(0.0375)	(0.0357)	(0.0370)	(0.0375)
Share_order_dummy	0.395*	0.559***	0.712***	0.610***	0.409*
	(0.228)	(0.198)	(0.195)	(0.198)	(0.213)
Technology_dummy	0.607***	0.394**	0.116	-0.219	0.354*
	(0.217)	(0.196)	(0.194)	(0.195)	(0.208)
Percentage of individual people as sales clients	0.00449	0.00279	-0.00824*	-0.00688	0.00272
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Percentage of domestic, non-state enterprises as sales clients	0.0022	0.00289	-0.00742	-0.00958*	-0.00201
	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)
Percentage of state enterprises as sales clients	-0.00287	0.00662	-0.00711	-0.00445	0.0028
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Investment in equipment per worker	0.00000063	0.00000128	0.000000677	0.00000434	-0.0000054
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.665*	0.0853	0.145	-0.0519	-0.198
	(0.394)	(0.279)	(0.269)	(0.284)	(0.306)
Manager education_dummy1	-0.000943	0.208	-0.034	0.0402	0.323
	(0.272)	(0.234)	(0.226)	(0.227)	(0.247)
Manager_education_dummy2	0.125	0.236	0.0193	-0.212	0.348
	(0.294)	(0.261)	(0.254)	(0.252)	(0.273)
Manager_education_dummy3	-0.000217	0.511	0.0199	-0.291	0.572
	(0.425)	(0.349)	(0.339)	(0.345)	(0.387)
Manager's age	-0.00556	1.84E-04	-0.00182	-0.00472	0.00156
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)
Manager's years of experience	0.0121	-0.00714	-0.0127	0.00397	-0.00618
	(0.011)	(0.010)	(0.009)	(0.009)	(0.011)
Abroad_dummy	-0.43	0.167	0.304	0.146	0.0698
	(0.303)	(0.244)	(0.237)	(0.236)	(0.262)
cut1	1.398*	1.265*	-0.574	-0.369	0.189
	(0.781)	(0.719)	(0.666)	(0.675)	(0.751)
cut2	1.717**	1.627**	0.0463	-0.0682	0.426
	(0.783)	(0.720)	(0.665)	(0.673)	(0.752)
cut3	1.999**	2.281***	0.486	0.269	0.627
	(0.786)	(0.725)	(0.664)	(0.671)	(0.753)
cut4	2.317***	2.526***	1.015	0.859	0.876
	(0.792)	(0.729)	(0.665)	(0.674)	(0.753)
Observations	204	202	199	202	188
LR chi-squared (18)	37.32	35.69	41.18	44.67	22.47
Prob > chi-squared	0.007	0.012	0.002	0.001	0.262
Pseudo R-squared	0.090	0.064	0.068	0.074	0.044

Notes: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation from JICA firm survey

Appendix 1: Map of the main corridors in Mozambique

Source: ANE 2006

Appendix 2: Description of the explanatory variables

Variable	Description
Beira_dummy	=1 if a company operates along Beira corridor, 0 otherwise
Service_dummy	=1 if a service company, 0 otherwise
Manufacturing_dummy	=1 if a manufacturing company, 0 otherwise
Year	Number of years since establishment
Log of number of workers	Log of total number of permanent and temporary workers at the end of 2008
Number of products/ services	Number of products or services produced in 2008
Share_order_dummy	=1 if a company shares orders with other enterprises, 0 otherwise
Technology_dummy	=1 if a company introduced new technology from 2006 to 2008, 0 otherwise
Percentage of individual people as sales clients	Percentage of individual people as sales clients structure in 2008 of the most important product
Percentage of domestic, non-state enterprises as sales clients	Percentage of domestic, non-state enterprises as sales clients structure in 2008 of the most important product
Percentage of state enterprises as sales clients	Percentage of state enterprises as sales clients structure in 2008 of the most important product
Investment in equipment per worker	Amount of investment in equipment divided by total number of workers in 2008 (MT: meticais)
Female	=1 if a manager is female, 0 otherwise
Manager_education_dummy1	=1 if the highest level of manager's education is secondary, 0 otherwise
Manager_education_dummy2	=1 if the highest level of manager's education is high-school, 0 otherwise
Manager_education_dummy3	=1 if the highest level of manager's education is university, 0 otherwise
Manager's age	General manager's age as of January - February 2009 when the survey was conducted
Manager's years of experience	Years of experience of general manager as of January - February 2009 when the survey was conducted
Abroad_dummy	=1 if a manager has management experience abroad, 0 otherwise

Abstract (in Japanese)

要約

本ペーパーは、企業アンケート調査を使用して、モザンビークにおいて運輸インフラ整備事業が企業の立地選択とビジネス環境評価に及ぼす効果の予備的分析を行うものである。開発の遅れたナカラ回廊（現在、道路整備中）沿線の企業と、開発の進んだベイラ回廊沿線の企業との間で、企業の立地選択要因とビジネス環境評価がどう異なるかを比較した。その結果、2 つの回廊の企業の間で、企業の諸特性をコントロールしても、企業の立地選択要因とビジネス環境の評価に有意な差があることが判明した。まず、立地選択に当たり、ベイラ回廊の企業は顧客との近接性を重視しているが、ナカラ回廊の企業はより良いインフラを重視している。また、ナカラ回廊の企業は未整備の運輸インフラを業務と成長の障害と考える一方、ベイラ回廊の企業は政府の行政・規制が障害と見ている。なお、これらの結果はまだ暫定的なものであり、現段階では、運輸インフラの整備状況が企業の立地選択やビジネス環境評価に影響を与える可能性があることを指摘できるにとどまることに留意が必要である。