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Walther, Olivier

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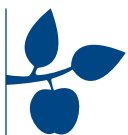
Business, Brokers and Borders: The Structure of West African Trade Networks

Olivier J. Walther, Ph.D.
University of Southern Denmark
and Rutgers University



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Editor: Olivier J. Walther, Ph.D.

Department of Border Region Studies
University of Southern Denmark
Alsion 2, DK-6400 Sønderborg
Tel. +45.65.50.83.93
Fax: +45 6550 1779
E-mail: ow@sam.sdu.dk

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Business, Brokers and Borders: The Structure of West African Trade Networks

Olivier J. Walther
Department of Border Region Studies, University of Southern Denmark, Denmark
and Division of Global Affairs, Rutgers University, United States,
ow@sam.sdu.dk

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Abstract

Using social network analysis, this paper studies the structure of trade networks that developed across West African borders. The first part aims to understand the centralization of cross-border trade networks. In a business environment where transaction costs are extremely high, we find that decentralized networks are well adapted to the various uncertainties induced by long-distance trade. We also study the trade-offs faced by traders between embeddedness and brokerage and find that long-distance trade relies both on the trust and cooperation shared among local traders, and on the distant ties developed with foreign partners from a different origin, religion or culture. In the second part, we study the spatial structure of trade networks and the influence of national borders on the development of social ties. The paper shows that the spatial form of trade networks is constrained by the historical origin of the traders engaged in cross-border activities. In those markets where trade is recent and where most of the traders are not native of the region, national borders are likely to exert a greater influence than in those regions where trade has pre-colonial roots.

Keywords: Social networks; trade; border markets; brokerage; West Africa

JEL classification codes: D85, F14, L14, P25

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INTRODUCTION

Chief Ibrahim Hassan looked out at the new developments being built around his compound and talked about the days when the city of Gaya was little more than a village along the Niger River. "*There were no houses or warehouses around here*", he said, pointing at a businessman dressed in a long white robe supervising the loading of a Nigerian truck. "*I have waited for seven years until the traditional authorities of old Gaya appointed me as District Chief. Nobody lived here on theses wild hillsides*". That was thirty years ago. A little more than 8,000 people lived in this Nigerien border town facing Benin and Nigeria, most of them from agriculture and fishing. They are now more than 45,000. Every day, hundreds of trucks loaded with food stuff, manufactured products, oil, and uranium concentrates, find their way along the crowded one-lane road that crosses Gaya, en route to the ports of the Gulf of Guinea or to the major cities of the Sahel. The Cotonou corridor, where Gaya is located, accounts for about half of the imported goods from Niger and three quarters of total Nigerien exports in terms of value. In the course of three decades, dozens of warehouses have been built by wholesalers attracted by the strategic location of the city, at the crossroad between three states. The city now stretches out over a length of four kilometres and the urban area – originally concentrated around old Gaya – has been extended more than ten times.

The spectacular economic development of Gaya – among many other border cities in West Africa – would certainly not have been possible without the existence of national borders. Without the price differences across countries and the bans affecting the imports or exports of certain agricultural or manufactured products, West African traders would have fewer incentives to move their goods across the continent and avoid the taxes collected by customs authorities. Considering that the cost of moving goods in Africa is the highest in the world (Teravaninthorn and Raballand, 2009), second-hand clothes, for example, would probably not be imported through Benin, and then stored in a warehouse in Gaya, before being re-exported illegally to Nigeria where they are subject to an import ban – a journey of about 1,800 kilometres across three countries (Brooks and Simon, 2012). However, the existence of national borders is not a sufficient condition for trade to flourish. Not all border cities are important market places. Some of them lack market and road infrastructure or are predominantly dominated by administrative or political rather than business activities. Many border cities also lack one of the most important ingredients of trade: entrepreneurs willing to develop transnational networks.

The interactions between opportunistic entrepreneurial strategies and strategic border locations remains poorly understood, despite their importance for local economic development and regional integration in West Africa. Using social network analysis, the objective of this paper is to begin to fill this gap by analysing the structure of cross-border trade networks in two border regions between Niger, Nigeria and Benin.

The first part of the paper aims to understand the centralization of cross-border trade networks, which is crucial for their efficiency. We wish to know whether traders are organized in a hierarchical structure in which a few central actors transmit information, orders and resources, or in a rather decentralized way, in which every actor is connected to everyone else. In a business environment where transaction costs are extremely high, we find that decentralized networks are well adapted to the various uncertainties induced by long-distance trade. We also study the trade-offs faced by traders between embeddedness and brokerage for the purpose of determining whether traders are strongly embedded within their group of peers or if they play the role of brokers beyond their own business community. The paper finds that trade relies both on the trust and cooperation shared among local traders, and on the distant ties developed with foreign partners, potentially from a different origin, religion or culture.

The second part of the paper considers the spatial structure of trade networks. We are

particularly interested in analysing the influence of national borders on the development of social ties. We study whether traders are organized with a multiplicity of cross-border ties, or according to several nationally-organized markets, with only a few brokers able to bridge the markets. The paper shows that the spatial form of trade networks is constrained by the historical origin of the traders engaged in cross-border activities. In those markets where trade has followed the recent liberalisation of commerce and where most of the traders are from outside the region, national borders are likely to exert a greater influence than in those regions where trade has developed since pre-colonial roots without major disruption.

RELATED LITERATURE

Trade and diasporas

Scholars have long debated whether the structure of trade networks in West Africa was mainly reliant on innate factors such as birth, kin, and ethnicity, or on acquired factors such as merit, skilful bargaining and a mastery of commercial codes. Empirical evidence from pre-colonial and colonial times supports both views. In some cases, traders recruited their sons, not their clients, into their businesses as junior partners, with birth providing legitimacy and allowing the creation of a group of obligors bound by family links and alliances. For example, family ties were particularly important in long-distance kola trade between Asante and Hausa and for Kooroko merchants during pre-colonial times (Amselle, 1977; Lovejoy, 1980). In other cases, the transmission of business knowledge between fathers and sons was been rendered impossible by historical disruptions, such as the brutal decline of trade cities or the establishment of national borders and railway roads (Howard, 2011). This lack of continuity has been illustrated by Baier (1980: 179), who showed that economic hardship in the early years of colonial rule, uncertainty in the cattle business, and inheritance law division of estates between heirs prevented the emergence of family dynasties in Eastern Niger.

Several empirical studies also indicate that kin was frequently not the preferred means of doing business due to the social pressure that resulted from economic transactions between family members. Family ties offer comfort but the pressure from kin is capable of destabilizing prosperous businesses or preventing existing activities to flourish. As shown by Whitehouse (2012), traders have developed original ways to accumulate wealth when kin relations constituted a burden. One strategy is to join groups with different internal norms, such as reformist religious movements that promoted austerity and a reduction of social obligations. In Niger and Nigeria, for example, numerous large traders have joined the Society for the Removal of Innovation and Reinstatement of Tradition (known as Izala) in the last decades not only because the Islamist movement provided trust and reputation in the conduct of business operations but also because social obligations such as baptisms, marriages, and funerals were reduced among its members (Masquelier, 2009). Another strategy adopted by West African traders is to conceal their prosperity from their families by adopting a modest lifestyle. Such a strategy is however at odds with the fact that ostentatious display and symbolic investments help constitute a clientele and constitute a very important part of the definition of a successful trader in West Africa (Walther, 2008). The third strategy adopted by traders is to emigrate and establish trade diasporas far enough from their community of origin to escape from the daily pressure from kin, but close enough to play the role of cross-cultural brokers (Curtin, 1984).

Since Cohen's (1969 [2004]) study on the historical development and political implications of the Hausa trade diaspora of Ibadan, such communities have been thoroughly documented by numerous scholars, who highlighted that these spatially dispersed communities provided a suitable ground for reducing uncertainty and ensuring trust among

their members. Historical examples include Mande-Dyula traders in Côte d'Ivoire, Hausa traders in Dagomba and Ashanti kingdoms, Hausa, Gonja and Mossi traders in Northern Ghana, Kooroko traders in Bamako, Yarse traders in Kumasi, and Hausa traders in Abéché and N'Djamena (Meillassoux, 1971; Schildkrout, 1978; Works, 1976). More recent research has focused on Northern Nigerian in Ghana and on Malian in Brazzaville (Pellow, 2002; Whitehouse 2012). The creation of modern boundaries has provided impetus for these business communities that compete with nation states for control over resources and form the local roots of transnational networks. In many border regions, traders have developed their activities in markets that allow them to benefit from differentials between national-states, sometimes turning places with little previous history of commercial activities into regional commercial hubs, such as in Northern Benin, North-East Ghana, and in trinational area between Niger, Nigeria and Benin (Chalfin, 2001; Grätz, 2004; Walther, 2012). Facing the constraints and opportunity of crossing national borders on a daily basis, these traders have developed social networks that transcend the territorial organisation of states and their nationally-organized markets.

Social networks

In a business environment characterized by weak formal institutions, social networks provide the trust that neither the state nor formal business institutions can provide (Fafchamps, 2004). Traders typically conduct repeated business transactions with existing business partners, with whom they can exchange reliable information about prices, national regulations, border controls, and demand. Past collaborations exert a considerable influence in shaping the structure of current trade networks, as well as the pattern of future business transactions. In the absence of formal contracts, the gradual accumulation of trust between traders enhances productivity (Fafchamps and Minten, 1999; 2002). The more successful traders are often the better connected, because social networks tend to improve access to crucial information on prices, market conditions and loans, facilitate the regularity of trade flows and reduce the effects of uncertainties. Traders are constantly facing variations in the volume and direction of their business activities due to the seasonal and cyclical food shortages that affect West Africa. Depending on the season or on the availability of supplies, economic flows can abruptly decline or change directions, which make the establishment of a network of business partners strategically located on both sides of national borders indispensable.

Social networks are also capable of responding to the instrumentalization of political disorder (Chabal and Daloz, 1999) orchestrated by national elites. The inability to predict which of the formal or informal rules will be applied by state representatives when dealing with trade agreements, blockade of key ports, or border conflicts, has led many traders to develop clientelist ties with state officials, or engage in local, regional or national politics themselves (Boone, 2006; Kraus 2002; Tangri 1999). Large traders engaged in transnational routes are even more concerned with minimizing the uncertainty of their business activities because crossing a border is equivalent to introducing an additional distance (Parsley and Wei, 2001) in an environment where transaction costs are already high. The capacity of social actors to pass through the border net (Nugent, 2008) depends very much on their social network, in particular the informal ties they maintain with state representatives, which ensure that crossing borders will not be too costly, lengthy and risky.

Despite their crucial importance, social networks are frequently viewed as a metaphor for informal relations (Walther, 2014). Formal approaches examining the consequences of social relations for economic action in Africa are growing (see Conley and Udry 2010; Fafchamps, 2004; Fafchamps and Minten, 1999; 2002; Matous et al., 2013) but still constitute a marginal field of research compared with those who look at trade through markets and

prices, respectively seen as general principles of organisation, and as devices of coordination, of economic activities (see for example Aker and Mbiti, 2010; Aker et al., 2013; Ihle et al., 2011; World Bank 2009). As mentioned by Spiro et al. (2013), a network approach is nonetheless particularly appropriate to understand trade, which is a fundamentally *relational* activity in which the constraints imposed on an individual and his outcomes are explained by the structure of the social network in which he is embedded (Brass and Krackhardt, 2012: 355). It doesn't mean, of course, that social actors are completely dependent on the structure in which they are embedded. Quite the opposite: every individual in a network can potentially have an influence on another actor and the network itself is nothing but the sum of the interactions between the actors. Network analysis argues that those approaches based solely on individual attributes, such as age, gender or race, are unable to take into consideration the fundamental fact that social actors are constrained by indirect relationships, not just relationships between ego and his alters, over which ego has little control (Burt, 1992).

Recent research conducted in a variety of disciplinary and geographical contexts has shown that economic actors tend to reach a balance between two extreme structural positions that can potentially be detrimental to their business activities: a situation where they are the most central actor of a limited number of closely knitted peers, and a situation where they are structurally positioned as a broker between several clusters of actors with hardly any ties to their own group (Burt 2005; Fleming et al., 2007; Meagher 2010; Uzzi 1996). A strong degree of embeddedness can be beneficial to the activity of traders, since it provides trust between peers and reduces the risks associated with business activities. Strongly embedded actors are therefore regarded as very central, in the sense that they are surrounded by a large number of other actors with whom they frequently interact to exchange information, draw resources or communicate orders. This particular form of centrality, known as degree centrality because it refers to the number of ties of each actor or *degree*, however captures only a partial aspect of the centrality of social actors, which can also arise from the fact that they are able to reach other actors beyond their own group and play the role of *brokers*.

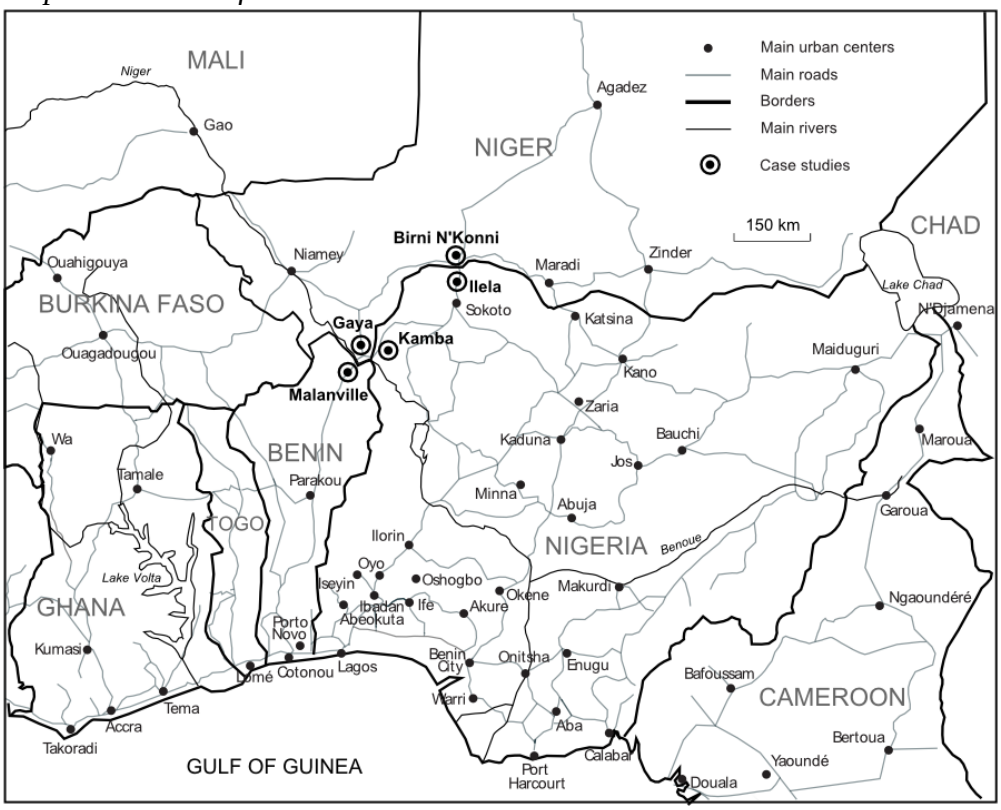
Brokerage is widely regarded as the form of social relation that provides external resources and ideas. As shown by Spiro et al. (2013), brokerage is a fundamentally dynamic process, which can generate value in three different ways. Firstly, brokers can transfer resources between two disconnected parties, a situation known as *tertius gaudens* or "rejoicing third". This structural position is routinely used by West African traders located in border regions, who act as a bridge between importers and final consumers along the transnational routes that link global markets to the interior of the continent. Secondly, brokers can facilitate matchmaking between two social actors to the benefit of each, a situation known as *tertius iungens*, or "the third who joins" (Obstfeld, 2005). In West Africa, traders are used to playing this role, by facilitating the creation of new ties between actors in several nationally-organized markets that would otherwise remain isolated. Finally, the added value of a broker can come from his ability to coordinate the business activities of third parties, a structural position that presents many advantages in those regions where transaction costs between business partners are high, such as between businessmen separated by huge distances and poor road infrastructure.

CASE STUDY AND METHODOLOGY

Two border regions

Data was collected between January and December 2012 on five border markets located between Niger, Nigeria and Benin: Gaya-Malanville-Kamba (GaMaKa) and Birni N'Konni-Illela (BNI) (Map 1).

Map 1. Location of case studies



Cartography: author, adapted from OECD (2009)

In the GaMaKa region, the development of long-distance trade activities has been considerably encouraged by the liberalisation of trade that occurred since the 1980s in West Africa. In this region – locally known as the Dendi – the native population is predominantly engaged in agriculture whereas the great majority of the traders are alien entrepreneurs attracted by the opportunities of cross-border trade. These Songhay, Zarma, Tuareg, Igbo, Fulani and Hausa traders have progressively transformed the small city of Gaya (estimated population of 44,000 in 2010) into a regional hub for re-export trade. Gaya is a particularly interesting location for wholesalers willing to trade with Nigeria, where the imports of numerous goods, such as second-hand clothes, are prohibited. A few kilometres south, the city of Malanville (60,000) is a regional centre for agricultural goods produced in the River Niger Valley, such as onion, cassava and cereals. A colonial creation, the market of Malanville is one of the largest in Benin and attracts a considerable crowd of foreign traders from neighbouring countries (Walther, 2009). The busy commercial activities of Gaya and Malanville contrast strongly with the relative decline of the neighbouring Nigerian city of Kamba (27,000), whose economic development has been slowed by the diminishing comparative price advantage of Nigerian products, poor road conditions and overall insecurity. Three hundred kilometres further north-east, the two border markets of Birni N'Konni (63,000) in Niger and Illela (32,000) in Nigeria also form a highly integrated border region. The two cities have a relatively long history of trade, which builds on the trade networks developed by the Hausa before colonial times. Today, Birni N'Konni and Illela constitute an important border post on the road between Sokoto and the northerner Hausaland in Niger as well as on the east-west N1 highway which cross the Republic of Niger. The region of Birni N'Konni is widely known in Niger for its onion production, which is exported to neighbouring countries.

A network approach

Our study builds on the formal tools and theories developed by Social Network Analysis (SNA), a growing area of research that allows researchers to map the nodes and ties that compose a network, measure the importance of social actors and test research hypotheses (see Scott and Carrington, 2012). Instead of focusing on one key products or sector, we chose to focus on a set of products that are important for the economic development of the border regions. The identification of the relevant products was based on a preliminary macro-analysis of international trade conducted on the basis of longitudinal data from national customs authorities, pre-existing surveys made in the border regions in the mid-2000s, and an analysis of the goods banned in Nigeria, which are of high importance for re-export trade in West Africa (Raballand and Mjekiqi, 2010, see Walther et al. 2012 for a detailed analysis).

This combination of data led us to identify four products whose trade would be highly important for the traders located in the two border region under consideration: building materials, cereals and flour, textile and used clothing. The trade of some of these products is sometimes considered illegal on one side of the border and legal on the other side; this is the case in particular for goods which are part of the re-export trade, such as textiles. As in previous studies (Igué and Soulé, 1993), we considered these trade flows as relevant for our survey, insofar as they did not generate criminal activities comparable to those of trafficking weapons, drugs or precious metals, but were the merely result of different legislation within the region.

Once these products were identified, we identified the actors involved in trading them. Social network analysis differs from most of the surveys conducted in Africa in the sense that we are primarily interested in collecting data on the relations – rather than the attributes – of social actors. In contrast to traditional surveys that consider social actors as independent units that can be added until they constitute a representative sample of the population, our data are, by definition, relational and refer to non-independent observations (see Contractor et al., 2006). Sampling a population would not work in our case because we don't know how the social actors are intertwined with each other before we start our analysis and, by randomly selecting some of them, we would miss a large number of relevant connections. In order to address this issue, we used snow-balling techniques, a recognized alternative that allow identifying new economic agents from among the subjects' existing acquaintances (Frank, 2012). Snowball sampling is a relational approach aiming at determining the boundaries of social networks. It differs from both the realist approach which presumes that the network is consciously experienced by the social actors, and of the nominalist approach, where the investigator imposes preconceived boundaries (Laumann et al., 1989: 68). It is particularly adapted to the study of cross-border traders, who don't necessarily belong to a formal professional institution in which insiders could easily be distinguished from outsiders, and whose number and activities are extremely difficult to evaluate from the investigator's perspective.

With the help of local freight agents, we selected the traders whose annual turnover was over 100 FCFA million (€152,000) in 2010. This threshold is used by freight agents to distinguish between small traders whose activities are predominantly limited to petty business and large traders, locally known as *patrons* in French, who can potentially employ a greater number of employees and conduct much more ambitious trade activities. Focusing on large traders, we conducted a first wave of interviews with 43 of them during which they were asked to nominate whoever they consider as business partners, whatever their age, gender, ethnic group, nationality or religious membership. We collected data on the existence and frequency of business interaction between the actors as well as on the type of relationships between them (family, neighbour, organisation member, work, other friend). We concluded

that a tie existed if two actors had been in business in the last two years (2010-2012). These interviews produced a list of 114 nominees. We conducted two additional waves of interviews with the actors mentioned at least three times by the first wave. After three waves of interviews, the same names started appear again and again which meant that population saturation was reached. With a response rate of 87.9% in the GaMaKa trade network and 88.9% in the BNI trade network, we work on an almost complete population and our results are not considered to be negatively affected by missing data (Kossinets, 2006). Contrarily to the Gulf of Guinea where some female traders have acquired prominent positions in the textile business (Golub, 2012), all the traders interviewed in this paper – except for one – are male. This can be explained by the selection of products operated in this study as well as by our decision to focus on large traders. A number of businesswomen are nonetheless active in both border regions, but most of them are small-scale retailers active in the sale of fruit, vegetables, fish, cassava, and traditional condiments, and maize (Author, 2008).

The quantitative network analysis was complemented with an additional wave of interviews conducted with the aim to collect information on the nature of the ties between traders, which are crucial to explain their formation and their historical development. Understanding the nature of the ties also helps to explain differences in economic behaviour, since weak and strong ties do not always lead to the same outcomes: strong ties are influential in determining trust, providing access to non-codified information, advice, resolution of conflicts, while weak ties are best at searching out non redundant information and are less likely to imply reciprocity. Qualitative data on the nature of ties was collected through professional biographies. For each of the 38 large traders who agreed to be interviewed, we reconstructed the geographical itinerary that led him from his region of origin to one of the two border regions studied and documented the reasons that had motivated him to move from one location to another.

THE STRUCTURE OF TRADE NETWORKS

This section investigates the social structure of the networks found between Gaya-Malanville, and Kamba (GaMaKa) and Birni N'Konni-Illela (BI). Our aim is to identify the overall centralized or decentralized nature of the networks and the importance of central actors and brokers, before turning to the spatial structure of the networks and look for a border effect.

Centralization: The social structure

We test whether the trade networks are more hierarchical (or centralized) or more heterarchical (or decentralized). Centralized networks are composed of a small number of actors with many ties and tend to be more efficient in terms of coordination, because information, orders and resources can be more easily transferred from central nodes to the rest of the network. The star network in which a single actor occupies the centre of the network and where peripheral actors have no ties between each other is the most extreme example of a centralized network. Its opposite is the fully connected network, a completely decentralized structure where every node is connected to every other node. This structure, which can be found in 'dark' networks connecting terrorists or criminals, is far less efficient that the centralized one but much more resilient to threats because of its redundancy of ties.

The structure of both trade networks is composed of relatively few decentralized actors (or nodes) with few business relations (or ties). As Table 1 shows, the BNI network is composed of 53 nodes and 64 ties, while the GaMaKa network is a little bit larger, with 83 nodes and 104 ties, including two isolated dyads of actors. Both are sparse networks with a low level of clustering (0.094, 0.062) and a low density: only 4.6% and 3.1% of the potential

ties between the actors are actually present in the network. Most of the actors prefer maintaining relations with a limited number of contacts: the average number of business partners is 2.4 in both regions. The BNI network has a relatively short characteristic path length – every actor can be connected to every other by an average of 3.7 steps – while the GaMaKa network has a surprisingly long average path distance of 11.1, which theoretically designate a network where information does not spread easily. On the basis of these structural characteristics, the BNI network approximates a random network, with a low degree of clustering and short paths, while the GaMaKa has a more atypical structure. Its long average distance and low clustering differ both from a regular network composed of long paths and strong clusters, and from a random network. It is also the exact opposite of a small-world network, where most nodes can be reached from every other by a small number of steps even if they are not neighbours of one another (Watts and Strogatz, 1998).

Table 1. Key metrics for the two networks

	Birni N'Konni-Illela (BNI) network	**Gaya-Malanville-Kamba (GaMaKa) network**
Number of nodes	53	83
Number of links	64	104
Number of dyadic isolates	0	2
Density	0.046	0.031
Average number of ties	2.385	2.357
Clustering coefficient	0.094	0.062
Average path length distance	3.712	11.092
Average degree	0.046	0.026
Average betweenness	0.053	0.036
Average closeness	0.279	0.042
Degree centralization	0.172	0.185
Betweenness centralization	0.403	0.320
Closeness centralization	0.268	0.020

Calculations by the author using ORA (Carley, 2012).

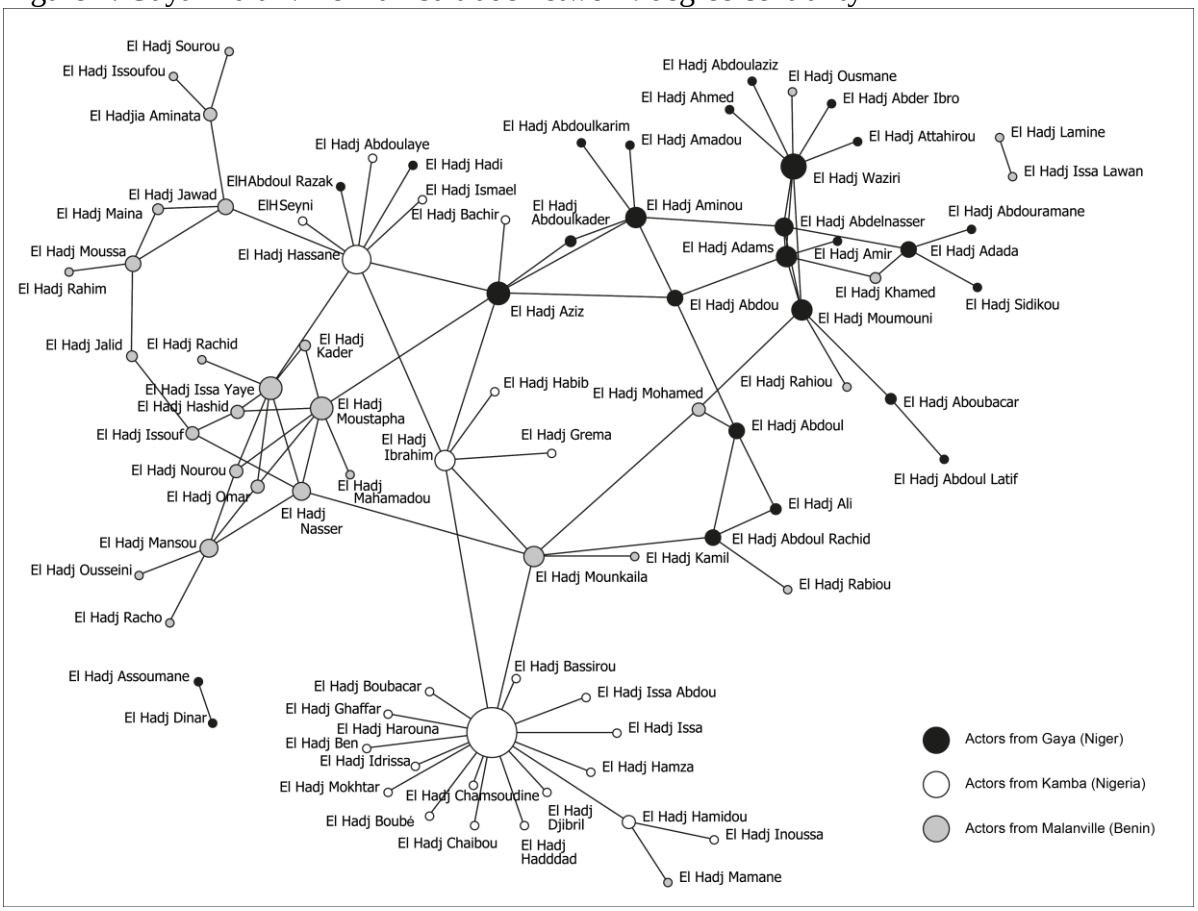
In addition to being loosely connected, the actors of both networks have relatively little centralization, as can be seen from their low average measures of centrality. The *average degree* measures whether nodes are linked to a particularly high number of actors, the *average betweenness* measures whether a node plays the role of a gatekeeper by controlling access to other nodes, and the *average closeness* refers to the minimum path distance between nodes. The decentralized nature of the networks is also confirmed by further centralization measures, which test whether the network contains potentially exceptional nodes whose centrality would strongly differ from the rest of the network. Table 1 presents three such measures: degree centralization, betweenness centralization, and closeness centralization. All measures vary from 0, a situation where no node is atypical in terms of centrality, to 1, a situation where the centrality of one node exceeds all nodes. Both networks have low values for degree centralization (0.172 in BNI and 0.185 in GaMaKa), which makes them less sensitive to fragmentation, since no node seems to be particularly highly connected.

The relative absence of very central actors is evident on Figure 1, which maps business relations between traders as well as their importance in terms of degree centrality. The size of the nodes reflects the number of ties developed by each actor and the colour refers

to each of the border markets. The distance between the nodes is a social distance, meaning that the more distant the actors are on the sociogram and the fewer business relations they have. A part from El Hadj Harouna[1], a Nigerian textile wholesaler from Kamba who entertain numerous business ties with relatively minor actors (in white at the bottom of the sociogram), most of the traders involved in the GaMaKa network express a low degree of centrality.

The relatively higher measures found for betweenness centralization – 0.403 in BNI and 0.320 in GaMaKa – confirm however the existence of prominent brokers, which makes sense in a border setting where much profit can be expected from bridging different partners from various countries. Closeness centralization is higher in the BNI network (0.268) than in the GaMaKa network (0.020), which indicates that it contains more atypical actors that are closely connected at small distance than the other network (individual centrality measures for top scoring actors can be found in Appendix 1 and 2).

Figure 1. Gaya-Malanville-Kamba trade network: degree centrality



Source: author. Produced with *ORA (Carley, 2012).

The major difference between the two trade networks comes from the fact that the proportion of ties exchanged within a group compared with the ties exchanged outside of the group – called homophily – is much larger in the GaMaKa network than in the BNI network. Despite the fact that local traders are located in the immediate vicinity of a national boundary, 86.6% of the ties exchanged within the GaMaKa network are with business partners from the same country, which is the sign of a highly homophilous network. Between Birni N'Konni and

[1] The names of the actors have been changed to protect confidentiality. The honorific terms *El Hadj* and *Hadjia*, reserved for Muslims who have successfully made the pilgrimage (Hajj) to Mecca, is commonly used in West Africa to characterize large traders.

Illela, on the contrary, Nigerien and Nigerian traders are not strictly segmented according to their country of residence: far more cross-border ties have developed and only 67.6% of the ties are within traders from the same country. This fundamental difference between the two networks is confirmed by the fact that the E/I index, calculated as the difference between external (E) and internal (I) ties for each country, divided by the total number of ties, is high and negative in the case of GaMaKa (-0.727**), indicating a preference for homophilous ties, whereas it is neutral in the BNI network (0.108), signalling that country membership is a not a relevant attribute for explaining the structure of the network.

Brokerage roles according to countries

Brokers can play different structural roles depending on whether they bridge actors from within or beyond their own group. The nature of the groups bridged by brokers can vary significantly: these may include formal groups, such as charity clubs, civic organisations or political parties, or informal groups, such as friendships, hobby groups, or neighbourhoods. In our case, we hypothesize that the existence of national borders creates several groups of traders according to their country of residence and test whether their brokerage roles vary according to their country membership.

To do so, we draw on the typology developed by Gould and Fernandes (1989), which identified several types of brokerage roles based on their structural position: coordinator, itinerant (also known as consultant), gatekeeper, representative, and liaison brokers. In a triad composed of a broker (A_b) and two other nodes, coordinator brokers belong to the same group as the nodes they bridge (A--A_b--A). In our case, this would refer to traders coordinating economic activities within Niger, Nigeria or Benin respectively. For their part, itinerant brokers connect two nodes from a different group than their own (B--A_b--B), for example when a trader from Nigeria connects two Nigerien or two Beninese traders. These two categories of brokers are known as *within* group roles (Spiro et al., 2013), because the two alters A or B belong to the same group, contrarily to gatekeepers, representatives, and liaison brokers, who all connect individual *between* groups. In a non-directed network such as ours, gatekeepers and representatives have identical values and connect a source or a recipient to a different group (A--A_b--B or B--A_b--A). Liaison brokers connect two nodes from different countries (A--A_b--C). This latter brokerage role is only relevant if there are more than two countries, which is the case for the GaMaKa region between Niger, Benin and Nigeria.

Table 2 summarizes the relative importance of each of the brokerage scores according to the country of residence of the actors. These are relative scores, which means that the raw scores obtained by counting the number of times each actor occupies a brokerage position within each network have been divided by expected values given group sizes. The results for the *within* group roles show that coordinator brokers bridging traders who belong to the same country are by far the most represented brokers in both networks and in all countries. Coordinators are particularly prominent in the GaMaKa network, which stresses the importance of national – rather than cross-border – business relations. Itinerant brokers bridging two actors from the same country are rare, except in the Nigerien part of the BNI network (0.87). As for the *between* group brokerage roles, our results indicate that gatekeepers/representatives are particularly represented in the Nigerian (1.00) and Nigerien (0.80) parts of the GaMaKa network. Liaison brokers, whose role of can only be analysed in a trinational setting, are surprisingly weakly represented in the GaMaKa region, where the conditions for bridging nodes that belong to different groups appeared theoretically to have been met. These results suggest that the most frequent brokers in the region bridge people from their own country. This has also another implication: that regional integration is maintained through relatively few cross-border ties.

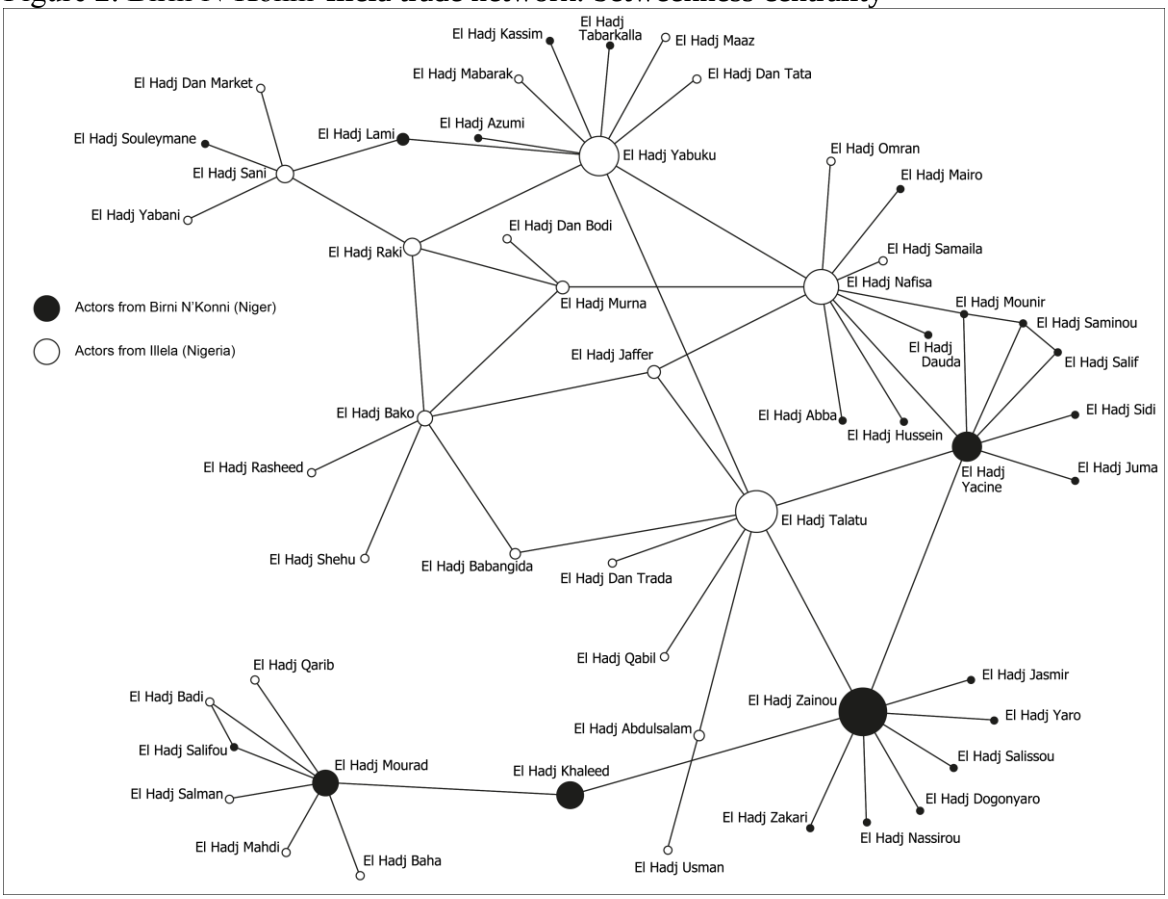
Table 2. Relative brokerage scores by country and case study

	Coordinator ($A--A_b--A$)	**Itinerant** ($B--A_b--B$)	**Gatekeeper/ Representative** ($A--A_b--B$, $B--A_b--A$)	**Liaison** ($A--A_b--C$)
BNI network				
Niger	2.04	0.87	0.58	-
Nigeria	3.10	0.19	0.42	-
Whole network	2.66	0.47	0.49	-
GaMaKa network				
Niger	5.59	0.16	0.80	0.73
Benin	7.12	0.38	0.35	0.04
Nigeria	4.38	0.13	1.00	0.27
Whole network	6.22	0.27	0.59	0.08

Source: author's calculation. Liaison brokers imply at least three groups (countries).

The sociogram presented in Figure 2 provides a visual representation of the betweenness centrality scores in the BNI network. Each actor is represented according to his importance as a broker (size) and according to his country membership (colour). The business relations between traders are mediated through a limited number of prominent brokers, such as El Hadj Zainou, a Nigerien wholesaler of cereals born in Maradi, and El Hadj Talatu, a native of Sokoto active in the business of sugar and cooking oil. Without these actors, the network would break into several isolated components, some of them organized by nationality.

Figure 2. Birni N'Konni-Illela trade network: betweenness centrality



Source: author. Produced with *ORA (Carley, 2012).

Cross-border traders

In order to better understand the importance of cross-border ties, we focus on the relatively few traders whose structural role is to connect different nationally-organized markets. In contrast to what may be initially assumed from a setting where markets are located at a very small distance from the border, not all traders are engaged in cross-border trade. As can be seen from Table 3, the proportion of cross-border business ties is significantly higher in the region of Birni N'Konni-Illela (31.3%) than in the region of Gaya-Malanville-Kamba (18.3%) as is the proportion of nodes with cross-border ties. There are a number of interesting differences within each region: the proportion of cross-border ties and nodes is always higher for actors located in Niger, as can be seen in the border markets of Gaya and Birni N'Konni, and the lowest proportion for traders located in Nigeria, as in Kamba and Illela. This element suggests macro dependence of Niger towards Nigeria as traders located in Niger are obliged to develop transnational business interactions.

Table 3. Cross-border ties and nodes

	BNI network	**GaMaKa network**
Cross-border ties	31.3%	18.3%
Nodes with cross-border ties	43.4%	31.6%
- In Gaya (Niger)	-	40.0%
- In Malanville (Benin)	-	34.5%
- In Kamba (Nigeria)	-	20.0%
- In Birni N'Konni (Niger)	56.0%	-
- In Illela (Nigeria)	32.1%	-

Source: author's calculation.

Large traders have adopted several strategies to develop cross-border ties. A significant proportion of them have chosen to commute between different cities or to adopt a bi-residential lifestyle. Among the traders for which we have detailed professional biographies, 38.9% report having developed business and/or residence in several locations across national borders instead of relying exclusively on foreign partners. El Hadj Mohamed is a good example of this particular form of mobility which blends business and family. This large Songhay trader was born in 1940 in Niger moved to Ghana in the 1960s to learn the business of second-hand clothing. The 1969 Ghana Aliens Compliance order forced him to leave the country and he settled in the Beninese market of Malanville where his trade activity progressively diversified and where he currently employs a large workforce composed of family members, salaried truck drivers, and about 30 temporary Beninese workers. Like many of his peers, El Hadj Mohamed conducts most of his business in Malanville where his family resides but can frequently be seen across the border in Gaya (Interview, Malanville, April 23, 2012).

This spatial strategy reflects the evolution of long-distance trade in the region and the comparative advantages provided by both border markets. The generation of traders who arrived in the Dendi in the 1970s usually invested primordially in Benin, due to favourable custom regulation that allowed goods to be re-exported to neighbouring countries. The situation changed in the mid-1990s, during which it proved more profitable to import goods from the world market directly to the city of Gaya, which has since then become a regional hub for the re-exportation of second-hand clothes to Nigeria. As a consequence, many experienced traders that had initially chosen to settle in Malanville have subsequently built large warehouses in Niger and continue to commute frequently between the two markets. The case of El Hadj Moussa, a Nigerien trader born in 1950, who also spend several years in

Ghana before moving to Malanville, is representative of this evolution. He has invested in several warehouses in Gaya and constructed a house in Malanville. While living in Malanville with his family he crosses the border on a daily basis to conduct his business on the other side of the Niger River (Interview, Malanville, November 21, 2012).

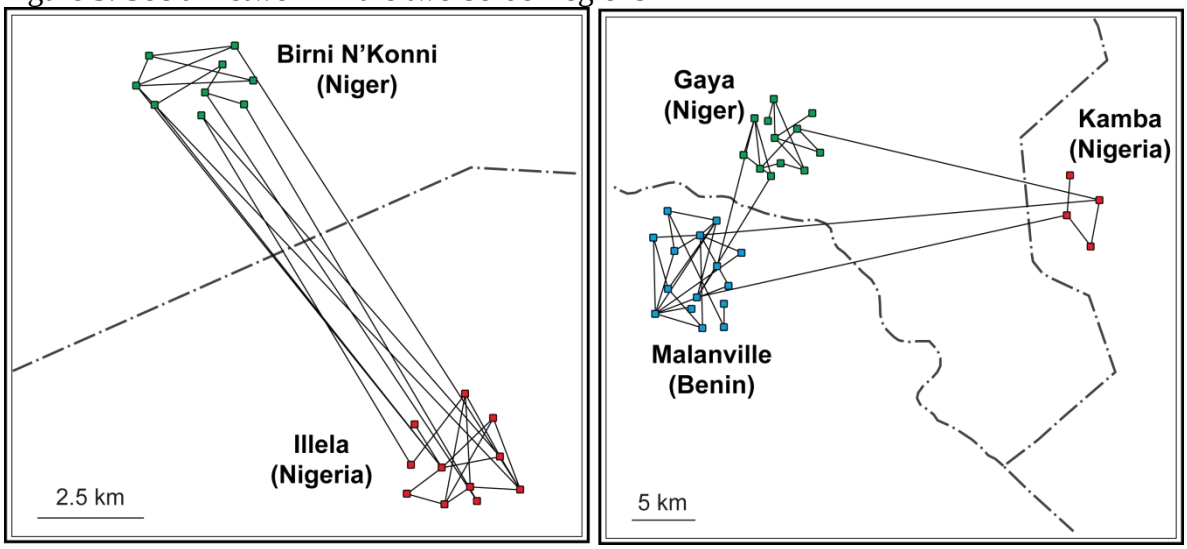
The wives of polygamous traders frequently reside in the major market cities. This is the case of El Hadj Hamidou, for example. This Hausa trader born in 1967 in Nigeria, successively married with a women in Kamba and in Sokoto. His personal choice is to keep conducting business in both locations because this allows him to benefit from short-term or seasonal opportunities (Interview, Kamba, November 16, 2012). Multiple residences provide numerous advantages from an economic perspective by allowing traders to be firmly embedded in several local societies simultaneously, helping the employability of their children in the local business, and providing access to valuable real estate or agricultural lands. In both regions, large traders are known for investing a significant portion of their profits in purchasing land available for urban development, building shops and warehouses, and renting large one-story property, locally known as *villas*. El Hadj Zakari, a Hausa native of Birni N'Konni, illustrate this investment strategy: born in 1960 and currently one of the wealthiest traders of the market, he has built around ten *villas* in his home town, which are used to house his family of 40 members, rented to local civil servants or temporarily loaned to his business associates (Interview, Birni N'Konni, March 16, 2012).

In a volatile environment such as the two border regions studies, wealthy traders are known for diversifying their investment strategies and have been reported purchasing agricultural lands either for developing irrigated crops or for rain-based agriculture (Cantoreggi et al., 2014). A good example is provided by El Hadj Bako, a Nigerian trader born in 1965, who has invested heavily in real estate in his home town of Illela where he owns several blocks along Main Street, who has built several shops and a parking lot in the neighbouring city of Birni N'Konni, and purchased numerous agricultural plots in Nigeria exploited by salaried employees (Interview, Illela, November 10, 2012).

The differences between the two networks become even clearer when the social networks are geolocalized. As shown in Figure 3, the BNI network is structured around numerous cross-border links. Most of the large traders from the region are used to travelling across the national border to do business with their foreign correspondents and none of them occupies a strong brokerage position between countries. By contrast, the GaMaKa network is structured around few cross-border ties that provide opportunity for a limited number of brokers. We argue that the differences in the form of these two business communities can be explained by their historical development since pre-colonial times.

The border area of Birni N'Konni-Illela is characterized by the highly informal nature of economic activities between Niger and Nigeria and the historical ethnic networks that have developed between them. A large majority of the traders come from the cities where they do business and are of Hausa origin. The continuity of trade observed in the BNI region does not seem to characterize the border region between Gaya, Malanville and Kamba. In this region, migration-and-settlement narratives collected locally emphasize the opposition between Songhay conquerors from the declining Empire of Gao, who took political power, and Kyanga chiefs of Hausa origin, who retained religious power over traditional cults (Walther, 2012). Trade activities are nowhere mentioned in the oral accounts of the encounter between these two populations, which could erroneously lead to conclude that the region has no prior history of trade. The Dendi region was however historically located on one of the main trade routes developed between Hausaland and Asante in the 19th century. Caravans of Hausa traders from Kano, Sokoto and Jega stopped in Gaya before crossing the Niger River on their way to Sansanne Mango, Yendi-Gamaji and Salaga, their final destination, where kola nuts were purchased (Lovejoy, 1980).

Figure 3. Social network in the two border regions



Source and cartography: author.

The region was more than just a milestone on the busy commercial routes of the Hausa: it was also a production centre of salt, extracted in the fossil valleys of the Niger River, and exported regionally by Dendi merchants (Lovejoy, 1986). These merchants widely spread their trade networks from that region and exerted a considerable influence in northern Benin and Togo since the 18th century (Curtin, 1984: 17). By the 19th century, the business activity of the Dendi was so intense that their language – which derives from Songhay – had become the dominant trade language of the northern regions of present day Togo and Benin. Today, the Dendi population of Gaya, Malanville and Kamba is predominantly engaged in agricultural activities and up to 80% of the large traders surveyed in this paper do not come from the city in which they work. Similar percentages were found in studies focusing on small-scale traders in the region (Walther, 2012), which is consistent with previous findings from north-eastern Ghana and north Benin, which indicate that foreign traders are usually in the majority in border markets and act as trailblazers for commercial diasporas (Grätz, 2004).

The discrepancy between the historical activities of the Dendi and their current professional occupations raises two interesting questions for further research. Firstly, it is unclear why trade is currently dominated by traders from outside of the region if the Dendi used to have a pre-colonial history of long-distance trade. In the absence of clear empirical evidence, it can only be hypothesized that trade in the Dendi suffered from major disruptions in the 19th century, perhaps due to the Fulani jihad of 1804-1808, which is known for having temporarily dislocated trade and destroyed the business of many traders in Hausaland and in the neighbouring regions (Lovejoy, 1980: 52).

It could also have been caused by the reorganisation of trade networks, from the interior of West Africa to the Gulf of Guinea, which would have made the commercial route passing through Gaya obsolete. Secondly, it is not known why Gaya wasn't a larger trade centre at the beginning of the 20th century if the city was situated along one of the main caravan routes between Hausaland and the Asante forest. Colonial records indicate that Gaya was little more than a small village with no significant market infrastructure when the French arrive in the region at the turn of the last century (Perron, 1924) and its population only reached 3,700 in 1960. Again, too little is known about the historical evolution of the city to judge whether its small size was due to the fact that it was only a transit town, where very few traders were actually established, or if it is because the Dendi spread from the Gaya region to southern Benin that Gaya itself did not become a major centre of commerce.

CONCLUSION

So far, studies devoted to cross-border trade have rarely – if ever – used formal approaches to represent and analyse social networks in West Africa, relying instead on econometric methods that consider the price of commodities as a proxy for evaluating regional integration or on qualitative approaches that aim at understanding the professional history of traders as well as their sociability. This paper argues that the models describing the organisational structure of social networks developed by social network analysis over the last decades also apply to West African trade networks.

Our first contribution is to study how trade networks vary in terms of centralization. We find that both networks are rather decentralized, with few business relations between the actors. Whereas the network between Birni N'Konni and Illela (BNI) approximates a random, with a low level of clustering and short paths, the network between Gaya, Malanville and Kamba (GaMaKa) has an atypical structure, characterized by a huge number of steps between the traders. Looking at the trade-off between embeddedness and brokerage, the former referring to the inclusion of social actors within their group, and the latter referring to the ties that actors build beyond their group, the paper shows that border trade relies on the presence of a small number of prominent brokers who are able to connect different markets.

Despite the proximity to national borders, we find that the GaMaKa network is mainly built around ties between partners from the same country, which is a clear indication of a homophilous network. The BNI network is again rather difference in that it contains a larger number of actors with cross-border ties. The difference in the spatiality of the two networks reflects the historical development of both regions. Between Birni N'Konni and Illela, in the heart of Hausaland, historical ethnic networks have probably constantly evolved since precolonial times. In contrast, the development of the trade activities between Gaya, Malanville and Kamba is much more recent and primordially linked to the liberalisation of international trade in the 1980s. These results show decisively that social relationships in trade can vary dramatically in terms of structure, which speak to the importance of using social approaches as a substitute for or complement to other methods of understanding cross-border trade.

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Appendix 1. GaMaKa network: Top scoring nodes for selected centrality measures

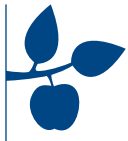
Rank	Agent	Degree	Agent	Closeness	Agent	Betweenness
1	Harouna	0.207	Aziz	0.052	Harouna	0.352
2	Hassane	0.110	Ibrahim	0.052	Aziz	0.278
3	Waziri	0.093	Mounkaila	0.051	Hassane	0.261
4	Aziz	0.077	Hassane	0.051	Mounkaila	0.251
5	Issa Yaye	0.077	Aminou	0.050	Ibrahim	0.221
6	Ibrahim	0.073	Harouna	0.050	Aminou	0.206
7	Mounkaila	0.073	Nasser	0.049	Moumouni	0.152
8	Moustapha	0.073	Moustapha	0.049	Abdelnasser	0.145
9	Moumouni	0.061	Abdou	0.049	Mohamed	0.137
10	Adams	0.061	Mohamed	0.048	Jawad	0.133
Mean		0.026		0.042		0.036
Std. Dev		0.030		0.009		0.074

Source: Calculations by the author using ORA (Carley, 2012).

Appendix 2. BNI network: Top scoring nodes for selected centrality measures

Rank	Agent	Degree	Agent	Closeness	Agent	Betweenness
1	Nafisa	0.212	Talatu	0.409	Zainou	0.449
2	Yabuku	0.192	Yabuku	0.394	Talatu	0.397
3	Zainou	0.173	Yacine	0.385	Yabuku	0.370
4	Yacine	0.154	Zainou	0.385	Nafisa	0.314
5	Talatu	0.154	Nafisa	0.385	Yacine	0.268
6	Mourad	0.135	Jaffer	0.351	Khaleed	0.238
7	Bako	0.115	Mounir	0.327	Mourad	0.219
8	Sani	0.096	Raki	0.319	Sani	0.115
9	Murna	0.077	Babangida	0.319	Raki	0.113
10	Raki	0.077	Murna	0.313	Bako	0.091
Mean		0.046		0.279		0.053
Std. Dev		0.049		0.052		0.112

Source: Calculations by the author using ORA (Carley, 2012).



University of Southern Denmark