Informal and non-market operations in activity systems: representative survey of Kanak households in the indigenous villages of New Caledonia

Leïla Apithy[1,2], Séverine Bouard[1*], Stéphane Guyard[1], Michel Passouant[3], Jean-Michel Sourisseau[4] and Jean-François Bélières[4]

[1] IAC, Équipe Territoires, acteurs et usages, BP 06 98825 Pouembout, New Caledonia
[2] Province Nord, Direction du développement économique et de l'environnement, BP 41, 98860 Koné New-Caledonia
[3] CIRAD, UMR TETIS, 34398 Montpellier, France
[4] CIRAD, UMR ART-DEV, 34398 Montpellier, France and Univ. of Montpellier, Montpellier, France.
*e-mail: bouard@iac.nc

Abstract: Measuring informal and non-market activities: a representative survey of Kanak households in the indigenous villages of New Caledonia. In 2011, a survey was conducted to examine the role of agricultural activities (agriculture, breeding, fishing and hunting) in the economies of Kanak households living in such villages in New Caledonia. In total, 1429 domestic groups have been interviewed. The survey focused on the activities performed during 2010 and was representative of the indigenous population at national level as well as in 10 areas within the 3 provinces of New Caledonia. In order to allow people to use them for further analysis, this paper describes the conceptual framework, the nature and the quality of the data.

Keywords: New Caledonia, indigenous village, agriculture, non-market, data paper.

1 INTRODUCTION

1.1 Context of the study: The present article is a data paper (Dedieu, 2014). The data presented herein are drawn from a survey conducted in New Caledonia among domestic groups living in indigenous villages or "tribes", i.e. families which grouped together during the colonisation process. It is important to know that the structure of Kanak society and its agriculture were deeply affected by French colonization, which started in 1854. At some point in time, settlers from elsewhere were allowed to occupy land for farming by the colonial government. In doing so, they caused Kanak communities to withdraw into small indigenous villages. Actually, the colonial administration organized and enforced this confinement of the Kanak in indigenous villages. This was called the "Régime de l'Indigénat". At the same time, the Kanak were forced to pay a colonial capitation tax. The reduction in available land due to the confinement and the need to find remunerative activities that would enable them to pay the tax, compelled the Kanak to radically simplify their agricultural production systems.

Conducted in 2011, the survey focused on activities performed in 2010. In addition to the article, readers can find methodological information and the results obtained (Apithy et al., 2014; Guyard and Apithy, 2014; Guyard et al., 2014) in the various publications produced within the framework of the study.

Furthermore, to allow the data to be reused and in the light of the difficulties encountered with the interpretation of data that are taken out of context (Borgman, 2012), we have provided a detailed description by means of metadata, in accordance with the DDI standard (DDI Alliance, 2014). For dissemination purposes, a single file in Nesstar format (Norwegian Centre for Research Data, 2017) contains all the data and metadata. While the Nesstar format allows data and metadata to be disseminated together, effective use can only be made of the actual data once they have been exported to one of the different formats available (Stata, SPSS or CSV for Microsoft Excel).

1.2 Agriculture in New Caledonia: New Caledonia is home to original, rural forms of social organisation (Djama, 1999), not recognised by the official systems of agricultural observation. The public statistical office of New Caledonia, a territorial authority under the aegis of the Institute of Statistical and Economic Studies (ISEE), continues to draw heavily on the models adopted in mainland France. The small scale of the production units, the organisational arrangements built around the households and the non-market approaches adopted by families

to capitalise on products – so typical of Kanak agricultural models – fall outside the standards usually observed. Certain actors in the field of rural development felt that the contribution to the territory's wealth by the households - by the way in which they live in tribes and make use of natural resources - was underestimated.

In 2011, therefore, at the request of the country's territorial authorities, and in particular North Province, Loyalty Islands Province and the government which are joint owners of the data, the Institut Agronomique néoCalédonien (IAC) conducted a survey in order to assess the contribution of families living in tribes to agricultural production, livestock farming, fishing and hunting as well as the social and economic role of such activities within these families.

The data associated with this article are drawn from the aforementioned survey which was intended to produce statistics valid for New Caledonia as a whole, for the provinces and for large infra-provincial "regions". The survey also aimed to provide a better understanding of the activity systems implemented by families living in tribes as well as the significance of the market / non-market and material / immaterial dimensions. Finally, it was intended to identify possible levers with respect to this specific social organisation with a view to renew local development policies. Thanks to its innovative character in the New Caledonian statistics, the study as a whole was jointly developed by the political and technical sponsors and the applied research institution responsible for implementing it in the field.

1.3 Conceptual framework: The aim is to understand the essential role of agricultural and extraction activities (fishing and hunting) in the tribes' economies (Bensa and Freyss, 1994; Leblic, 1989; Bouard, 2013; Gaillard and Sourisseau, 2009; Sourisseau et al., 2010).

The choice of observation unit has been adapted to the specific context of a traditional social organisation and non-contractual family agriculture with a prevailing non-market dimension. The procedure combines an approach by stabilised observation units, calling on existing survey mechanisms (in this case the general population census, GPC), and a comprehensive qualitative approach revising these units in light of their tangible and observed relevance (Couty, 1983; Winter, 1983). We also drew inspiration from the notion of socio-economic units which are groups expressing the functions of residence, consumption, agricultural production and accumulation (Gastellu, 1980). The main observation unit adopted is thus the "domestic group", comprising all the people living on the same residential plot, sharing meals and some of the agricultural work. People deemed to belong to a domestic group are those members living in one of the group's houses all year round as well as those living elsewhere during the week (to work, study, etc.) but who regularly return to their home during holidays and any member who spent at least 6 months in the household during 2010. The domestic group also represents the basic unit of accumulation, despite the fact that this may also be assigned to more broadly inclusive groups such as clans and tribes, in particular with regard to land (Fig. 1).
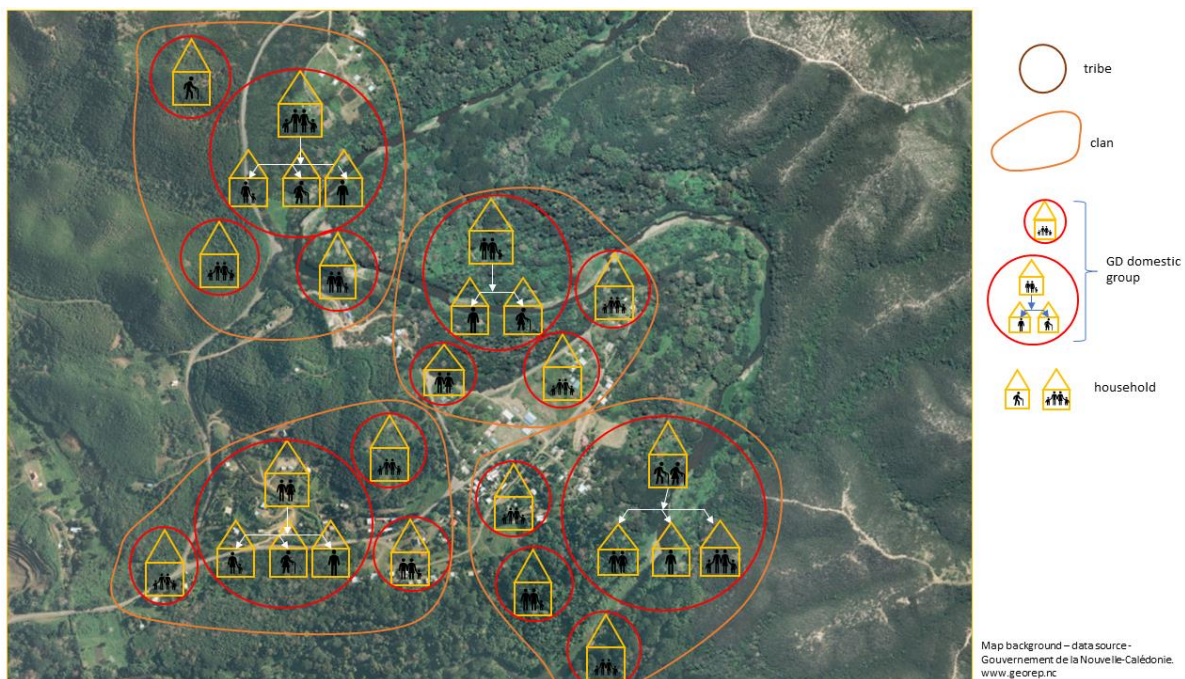

Figure 1. The embeddedness of households, domestic groups, clan and tribe.

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The statistical population concerned includes all domestic groups living in tribes, regardless of whether the individuals practise an agricultural activity or not. Only the geographical criterion of residence is decisive.

The average number of households per domestic group is highest in the Northern Province, where it is 1.3 compared to 1.2 in the South Province and the Loyalty Islands Province. In the Northern Province, there are 5,900 domestic groups and they represent 65% of this province's total population. In the Loyalty Islands Province, 98% of the population is tribal, i.e., 17,150 individuals in 3,350 domestic groups. Half of them live on the island of Lifou. Finally, in the Southern Province, the 10,390 tribal residents, divided into 2,320 domestic groups, comprise only 6% of the total population. Each domestic group consists of an average of 4.9 persons, with the groups being generally larger in the Islands (5.1) and smaller in the Southern Province (4.5). To construct explanatory models of overall income with a view to understanding the role of rural activities within this, a systematic approach was adopted. Demographic characteristics and the combination of different activities practised as well as insertion in social and institutional networks all help identify the social organisation of the tribes. Descriptions of the living conditions and equipment levels of domestic groups serve to estimate their standard of living while the type of agricultural equipment and the land farmed provide information about production methods. By taking all farm activities into account, be they formal or informal, together with the other activities, it is possible to identify the total wealth generated within the tribes as well as the roles played by the products in maintaining social ties.

In addition to the information from the structure surveys (factors of production, activities system, human capital, market access, etc.) and the agricultural accounting record (production volumes, costs, prices, net margins, etc.), the data collected serve to characterise the different indicators of capital used in the sustainable rural livelihoods approach (Chambers and Conway, 1991).

2 PRESENTATION OF THE DATASET: The data are presented in a Nesstar file, which incorporates the data as well as all the metadata, in DDI format. These can be accessed by means of the freely downloadable Nesstar publisher software.

2.1 Sampling and extrapolation: While the observation and analysis unit is the domestic group, the unit used for the purposes of random and representative sampling is the household, as described by the ISEE (i.e. all individuals living in the same main house; a domestic group can therefore incorporate several households). The initial sample was drawn at random from the 2009 GPC database of households living in tribes, doubly stratified according to the geographic criteria (10 infra-provincial zones) and household size (7 strata). According to the expertise and practices of the ISEE, a standard survey rate of 14% of the households was applied in each of the 70 strata. The final sample differs slightly from this survey plan, in part drawing on information not in the census lists. Ultimately, 1,786 households were surveyed corresponding to 12.5% of the households of a tribe. The domestic groups were reconstituted at the time of the survey by examining the ties with other households, and in particular the practice of taking meals together.

The analyses are extended to the population as a whole using Horvitz-Thomson estimators (Ardilly, 2006). To this end, an extrapolation coefficient was calculated for each domestic group. The calculation was made in three stages: the adjustment of the household sample, the calculation of a coefficient for the domestic group as an average of the coefficients of the constituent households weighted by the number of member in each household and a rounded value of the coefficient obtained. The sampling bias was calculated by approximating the total population recorded to that measured using our estimations, thereby enabling us to validate the sample, the coefficients and the selected estimators simultaneously.

2.2 Description of the data: The data refer to 1,429 domestic groups. They are organised into 4 tables constructed at domestic group level (1,429 lines) or divided into more detailed format with regard to each household member (6,652 lines).

Table 1 presents the organisation of the main themes, with the number of lines and associated variables, providing a synthetic presentation developed subsequently. The detailed data dictionary is accessible in the Nesstar file showing the name, definition, format and nature of the variables as well as the descriptive statistics parameters, etc.

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Table 1. Main themes explored and number of lines and variables.

Main themes	Unit of observation	No. of lines	Main sub-themes	No. of variables
Total	–	–		136
Identification	DG or individual	–	Domestic group, household, individual code Geography Extrapolation coefficient	6
Demographics	Individual	6,652	Age, gender, place in the domestic group Schooling Activities practised and labour time	15
Equipment and land	DG	1,429	Equipment Agricultural equipment Land used	18
Production volumes	DG	1,429	Agricultural production / extraction volumes (hunting, fishing) Destination of the products	50
Income	DG	1,429	Agricultural and extraction income Income from other activities Welfare income and other income	47

DG = domestic group.

There are three types of variables:
– discrete quantitative variables, the number of workers expressed as integers;
– continuous quantitative variables expressed in the form of decimal numbers where the units are acres in the case of area and Pacific francs (FCFP) for monetary quantities; and
– qualitative variables expressed in characters with a clear designation of the term concerned.

2.3 Identification: In all data tables, a group of identification variables:
– identifies each line of the tables and resituates it geographically, regardless of whether it is for a domestic group or a household with its members. It should be noted that the domestic group codes are specific to each table and cannot be used to create links between the tables;
– specifies the extrapolation coefficients calculated for each domestic group after the sample has been adjusted. For both the individual file and those relating to the domestic group, the weighing must be applied to each line in order to produce results which are representative of the entire population of the tribes.

2.4 Demographics: At individual level, these data characterise the population of the tribes and provide information concerning the composition of the domestic groups and the households. The age, gender, relationship with the head of the group and household, the level of education and the highest diploma obtained are given for each member together with information concerning the income-generating activities performed throughout 2010 and the time devoted to each activity.

2.5 Equipment and land: The equipment belonging to the domestic groups is described by means of access to water and electricity and whether or not they have a mobile phone or a fridge. Agricultural equipment is divided into four categories: small equipment (machetes, crow bars, picks, etc.), medium-sized equipment (tillers, hand-operated sprayers, brush cutters, etc.), large motorised equipment (tractors and site machinery used for agricultural purposes) and specialised equipment specific to an activity and not widely used (copra ovens, bee-keeping equipment, etc.).
The extent of available land compared to the small plots farmed means that we only take account of the land actually used during 2010. Accordingly, the data report the area of the plots planted with annual or perennial plants (orchards, coconut groves, etc.).
The areas were estimated by the researchers when they had access to the plots in question or based on the respondents' declarations if not. In every case, the data were cleaned and this variable was, where necessary, re-estimated according to the type of crop planted, the number of plants or trees and the area covered.

2.6 Production volumes: To evaluate the contribution of the tribes to agricultural production in New Caledonia, it was essential to determine the production volumes (plants and animals) and extraction volumes (hunting and fishing). These were identified for 2010 with the assistance of the people interviewed. As the vast majority of the domestic groups do not weigh their harvests and keep no accounting records, the questionnaire relied on daily practices, taking account of the wide range of tools used for harvesting purposes (plastic bags, tote bags, palm-leaf baskets, etc.) and the harvesting practices (weekly, monthly, during periods of traditional customs). The team of interviewers then measured the weight of each of these "local" units of measure and created a specific chart crossing local unit and conventional one's (for example: in New Caledonia, a pick-up truck of eggplant is equivalent to an average of 276.9 kg). These quantities were then converted into conventional units of measure using these charts created specifically for the study.

2.7 Income: The total income of the domestic group was broken down as follows: income linked to non-agricultural labour activities, welfare income, "exceptional" income (donations, winnings from gaming, inheritances, etc.) and income derived from agricultural and extraction activities (IAE). The first three factors were estimated directly using the respondents' declarations while the last one was calculated once its individual components had been collected.
Unsold produce (kept for own consumption or offered on a daily basis or during traditional ceremonies) contributes to the total wealth created by a domestic group. To estimate this non-market wealth, we allocated the market price to the produce farmed or products extracted and not marketed. The total IAE corresponds to the revenue derived from sales added to the value of the non-market goods minus the annual production costs and the depreciation of the agricultural and fishing equipment. By allocating the ratio of the value of non-market goods to sales revenue to these last two variables, a market and non-market IAE can be calculated which together correspond to the total IAE.

2.8 Geographic cover: The survey was conducted in 288 of the 340 tribes present in New Caledonia. Once extrapolated, the data are representative of the households of the tribes at national level, in the three provinces (North, South and Loyalty Islands), and within the 10 infra-provincial zones.

2.9 Time frame: The data collected refer to the whole of 2010. The work times and production volumes were totalised for 2010 as a whole. An individual was deemed active if he/she participated in an activity creating resources or generating income, even if this activity could be considered as a leisure activity (valorisation of fishing products through consumption at home or exchange, for example) and even if this activity was only practised occasionally and was no longer practised when the survey was conducted. Individuals under the age of 15 were not deemed active, even if they participated in agricultural production or extraction activities; the fruit of their work was nevertheless taken into account in the domestic group total. For stock data, the situation is taken as at 31/12/2010, for instance, the number of cars is requested at the situation at 31/12/2010.

3 QUALITY ELEMENTS: The details of the methodological choices made when conducting this survey were published (Apithy et al., 2016b) and are partially reproduced below, as well as in a working paper (Apithy et al., 2014).

3.1 Survey mechanism: The information was collected by means of a questionnaire conducted on a face-to-face basis with at least one member of the household in order to collect all the data in a single operation. This questionnaire is included with the metadata. Several resource persons were involved in developing it, from formulating the questions to determining the units or measure or the content of the nomenclatures to be used. The questionnaire was validated after several field tests.
The team responsible for collecting the data in the field consisted of two coordinators, two field supervisors, ten investigators and three trainees.
In order to offer the respondents the best possible welcome and ensure the best possible availability of the people to be interviewed, the study was presented to the traditional authorities and a personal letter was sent to the domestic groups before the investigators arrived. Generally speaking, the survey was well received, with interviews lasting an hour and a half on average. The data collected were then computerised using the Microsoft Access© software.

3.2 Sampling quality: The initial sample selected by the ISEE consisted of 2,000 households and a replacement list containing a further 2,000 names to compensate for any absences or refusals to participate. The investigators had to cope with numerous absentees, who were replaced by "available" households chosen at random in the village.

This adaptation has no impact on the final representativeness of the data or on their quality, as the final sampling rate and the value of the extrapolation coefficients were controlled and adjusted for each layer with a return to the field and additional collection procedure implemented if necessary.

With a broad initial target of 2,000 households, the effective completion rate (questionnaires completed in full after verification and telephone supplement if required) was 89%, providing a final sample of more than 12.5% of all households living in a tribe.

To check the quality of the sample and the adjustments implemented, we used estimators to recalculate the number of people in the survey database. Across the territory as a whole, this resulted in a slight under-estimation of the population using the survey data (Table 2).

3.3 Data quality: The data were cleaned, with any input errors and inconsistencies corrected, extreme values and incomplete data checked and duplicated data identified (Berti-Equille, 2006). The raw data were processed to produce files for analysis.

The corrections made by the survey team – which sometimes even involved making a telephone call or a return to the field - resulted in a complete dataset deemed to be error-free. The quality of the dataset was substantiated by the fact that it was in line with the results of other survey mechanisms (ISEE, 2010; DAVAR, 2011; ISEE, 2015).

The dataset we present here is a selected excerpt of the original set. Il contains both raw data drawn directly from the collection procedure and the result of the data processing (aggregation of secondary units in the domestic group and certain calculations such as the RAP).

3.4 Anonymisation: To ensure the anonymity of the respondents, the names, first names, addresses and telephone numbers are not included in the data provided. The most detailed level of geographic location is the infra-provincial zone, with no information collected at municipal or tribal level. Finally, to avoid certain domestic groups being identified despite these precautions, the data were divided into 4 independent thematic tables, with the recording order and group identifiers differing from one table to the next.

Each of these tables was studied with the help of experts in the New Caledonian agricultural sector, and no pseudo-identifying variable was detected. Where applicable, however, only the information presented in the same thematic table was processed; no link could be made with regard to the other data relating to this domestic group. If users wish to combine data from different tables, specific access conditions can be discussed and supervised by the IAC.

Table 2. Sample and adjustment assessment

	Population extra-polated from the sample	ISEE census population	Deviation as a percentage
Total	56,662	56,995	-0.58%

3.5 Metadata: The metadata enclosed with the data tables are divided into 5 main sections in accordance with the DDI standard implemented with Nesstar Publisher (Figure 2):

– a description of the document (data and metadata) including its title, authors, producers and dissemination method, citing method, etc. To a certain extent, these are metadata concerning the metadata;
– a description of the study, with general information concerning the survey including the data content, method, survey procedure, observation units, spatial and temporal coverage, authors, producers, funders, dissemination, access conditions, etc.;
– a description of the tables including, the format, dimensions, processing procedures, etc. for each table;
– a description of the variables in each table including the type, name and associated label (long name), definition, list of qualitative variables, etc.;
– the additional documents (questionnaire, investigators guide, summary sheets of the main results).
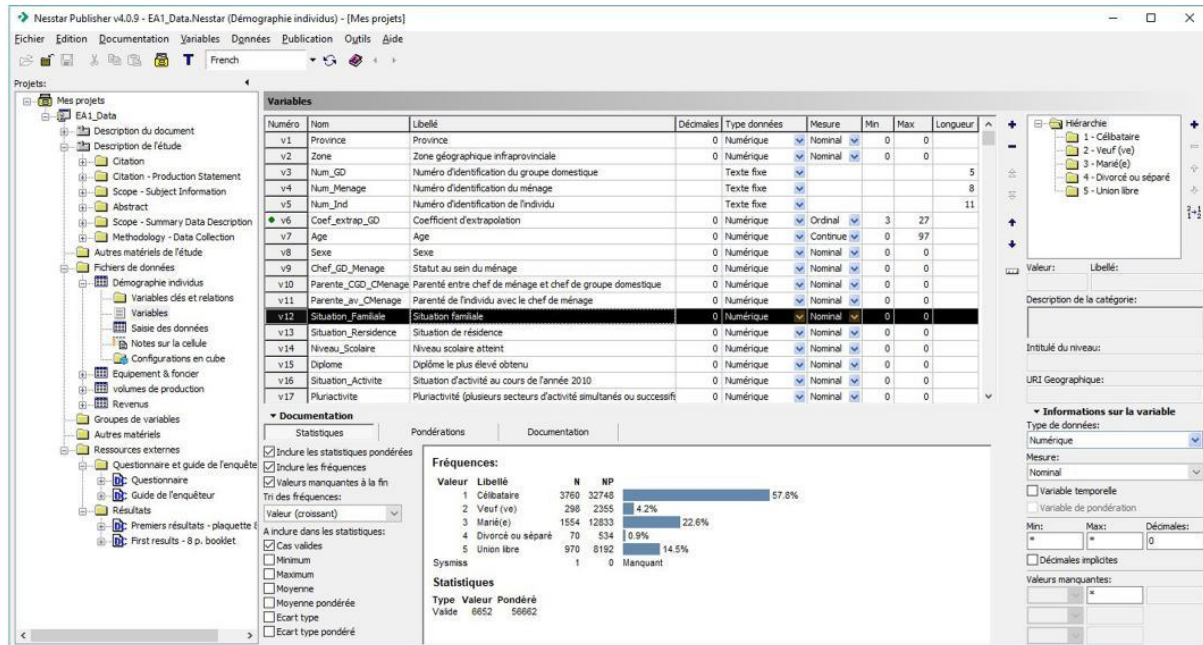
Figure 2. Data and metadata in Nesstar Publisher.

4 CONCLUSION
4.1 Key results: The final analyses served to:
– produce a detailed description of the population living in tribes;
– improve knowledge of how these social groups operate;
– evaluate the importance of agricultural and extraction activities for these domestic groups with regard to the time devoted to them, the volumes and values produced and the importance of "non-monetary wealth" in the total income of the families and, more broadly speaking, the country. This demonstration of the significance of tribal activities in the socio-economic reproduction of the families served to renew the debate on rural development policies, in particular with regard to revising provincial development codes.

The survey offers unprecedented figures indicating that crop production is as much given as consumed, respectively 32% and 36% of the volumes. It also shows, for example, a production of 10,800 tonnes of tropical tubers by tribal households with a marketed share of around 10% of the total; whereas, for the same year, official statistics showed that only 470 tonnes of tubers were marketed via formal markets (final production) for all producers in New Caledonia (DAVAR/SESER, 2011).

A second strong result is the significant contribution of agriculture, livestock, fishing and hunting to the income of tribal households. In fact, when only monetary income (wages, social income, market agricultural income, etc.) is taken into account, these activities account for only 6% of income. But if we take into account the real contribution of these activities to the global income, this share then amounts to 28% of the total (Guyard et al., 2013).

These figures also reveal that social transfers, both public and community, complement and combine to secure the incomes of domestic groups. The social entrenchment of tribal activities is fully confirmed; they are both producers of monetary wealth and food supplements and are also the source of a circulation of goods that ensures the continuity of customary ties. While it was anticipated that custom would be difficult to survive in the face of economic development and the multiplication of social assistance (Bensa and Freyss, 1994), these results reflect the strength of social ties as measured by exchange in the tribes.

These results raise new issues in terms of public policy by revealing, in particular, the commercial dimension of production and, beyond that, the fundamental nature of agriculture in feeding tribal households as well as in maintaining social ties.

Analysis of the data collected has already resulted in the publication of a study report (Guyard et al., 2014) and specific book chapters (Bouard et al., 2015; Guyard and Apithy, 2014; Apithy et al., 2016a), both of which include specific analyses.

4.2 Perspectives: Additional analyses could be conducted, as there is an abundance of data available, some of which have yet to be sufficiently processed, in particular with regard to how domestic groups function in relation to the significance of non-monetary trade and income. Further analysis could also be conducted by linking these data and the data produced by other collection systems to obtain a more comprehensive characterisation of the agricultural sector. Furthermore, it would be interesting to cross-reference these data with data from other fields, for example reconciling the data with studies on the environment, water management, food or health. Comparisons with how economic units function in relation to the public policies implemented in other countries with similar systems would also shed additional light on the subject.

By providing detailed quantitative information on a little known statistical population and a topic that has to date been insufficiently measured, these data could help create more suitable questionnaires and calibrate the associated samples in the organisation of new surveys (Bem et al., 2008).

Finally, the static nature of the data produced limits their use in terms of simulating and envisaging the role of extractive activities in the national balance. One recommendation would be to conduct such a similar survey at regular intervals to facilitate dynamic use by involving different research and development teams as required, in particular to carry out econometric tasks.

These different perspectives highlight the benefits of developing a multi-disciplinary observatory at the national level. Such a project would provide more tangible avenues for developing and introducing appropriate public policies.

4.3 Precautions: To use the data, it is important to understand the conceptual framework underlying the definition of the variables and observation units, in particular the domestic groups.

Furthermore, the data relate to 2010 and are only representative per geographical zone and after extrapolation coefficients have been applied.

It should be noted that, the four data tables are independent. While they relate to the same statistical units, they cannot be reconciled as they each have specific identifiers and the distribution of the recordings differs from one to the next. This means that a study of the relationships or correlations between socio-demographic data and income, for example, cannot be carried out, in order to respect anonymity. This is because the population is relatively small and it was too risky to provide all the interconnected data. The original data comprise more than 70 inter-related tables. Using them requires an in-depth involvement in the rationale underpinning the study. Access can nevertheless be envisaged through agreements to be established with the IAC.

The data are made available in accordance with the terms of Creative Commons licence CC-BY-NC-SA-4.0: Attribution-NonCommercial-ShareAlike 4.0 International. They may in no event be used for commercial purposes and can only be reshared in the same conditions as the original.

Whenever the data are used, the sources must be indicated. They should be cited as follows:

Apithy Leïla; Bouard Séverine, Guyard Stéphane; Passouant Michel; Sourisseau Jean-Michel; Bélières Jean-François, 2017, "Agriculture des tribus de Nouvelle-Calédonie"[database], IAC, retrieved from CIRAD Dataverse: https://dataverse.cirad.fr. The relevant doi is: 10.18167/DVN1/VWWVXU.

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