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Dynamics and trends of drug dealing: A local labour system perspective

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Dynamics and trends of drug dealing: a local labour system perspective

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Dynamics and trends of drug dealing: a local labour system perspective

Manuela Pulina¹ and Alessandro Salis

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This study provides a dynamic analysis of illegal drug trafficking in the Italian region of Sardinia, using the Local Labour Systems (LLS, ISTAT) framework. Data from major regional newspapers (January 2017 - December 2022) were validated through institutional reports. A multivariate biplot analysis reveals an increase in drug seizures and the Island's role as a hub for national and international drug trade, facilitated by local and traditional mafia organizations. Related crimes are also infiltrating the legal economy, particularly in the coastal real estate market. This study highlights the urgent need for targeted institutional and community strategies to protect younger people, who are increasingly involved in trafficking.

Keywords: Drugtrafficking; Organized Crime; Local Labour Systems; Multivariate Biplot

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1. Introduction

Within the United Nations 2030 Sustainable Development Goals, two targets relate to illegal drugs. The first indicator connects to the demand side and aims to strengthen the prevention and treatment of substance abuse. The second indicator links to the supply side and aims to reduce illicit financial weapons trade and combat all forms of organised crime (UNODC, 2024). As addressed in the UNODC latest report, organised criminal groups are exploiting institutional gaps and social unrest to expand highly profitable activities such as drug, wildlife and human trafficking, financial fraud, and money laundering, together with all sorts of complementary crimes (e.g., illegal mining/logging/fishing, hazardous waste dumping) that produce great harm to communities and ecosystems (UNODC, 2024).

Indeed, the interplay between drug trade and other criminal activities poses significant challenges to the formal economy and democracy, leading to severe health and socio-economic consequences (Singer, 2008; Uzuegbu-Wilson, 2020; Eurojust Report on Drug Trafficking, 2021). Drug dealers often recruit marginalised youths, contributing to public order issues and insecurity among residents in urban areas (Feltmann et al., 2021). Several studies indicate that extreme poverty, ethnic segregation, and family and personal distress often drive individuals to drug dealing as an economic necessity (Nelson, 2023).

As UNODC (2024) highlights, amongst other types of drugs, cocaine seizures reveal an upward trend. In 2022, the global supply of cocaine surged to over 2,700 tonnes (+20% from 2021), with 355,000 hectares dedicated to its cultivation. The primary trafficking routes extend from South America to Western and Central Europe, as the second-largest market for cocaine after North America.

Within Europe, the Italian region of Sardinia, amongst other areas, only in very recent years has become a key hub in national and international drug trade. Institutional operations such as the *Platinum-DIA* highlight this region's growing strategic importance, evidenced by the Calabria mafia, namely 'ndrangheta, establishing a profitable drug trade (DIA, 2021a). As remarked in the latest report of the Italian institution (DIA, 2023), although there are no native mafia groups in Sardinia, Italian mafias are more and more involved in the local legal economy, and especially the real estate sector, facilitated by the drug trade and related money laundering (see also PCAC, 2024).

The increasing scale of drug trade and consumption necessitates a territorial analysis to understand potential impacts and provide stakeholders with

innovative insights into trends and dynamics. The present research employs Local Labour Systems (LLS), defined by daily commuting flows identified by ISTAT's ten-year census, as the geographical reference (Casado-Diaz, 2000; Maré et al., 2014; ISTAT, 2018; Faggian et al., 2018). These systems mirror socio-economic relationships, including illegal activities. By analysing these linkages, the research synthesises the complex structures of drug dealing in Sardinia. Through a multivariate biplot, a graphical interpretation of dynamics, trends, and specificities within the drug trafficking on the island is provided.

Data is gathered from two main prestigious regional newspapers, *La Nuova Sardegna (N.S.)* and *L'Unione Sarda (U.S.)*, from January 2017 to December 2022, daily. This information is then validated through the institutional operations held in contrast to the drug trade, trafficking, and mafia criminal organisations.

2. Sardinia within the drug international and national trade

The geographical centrality of the island is correlated with the projections of mafia-style criminal organisations, as noted in the Ministry of the Interior documents (DIA, 2022a). As remarked by DIA (2023), sophisticated cannabis cultivation, transformed into marijuana and hashish, in remote areas on the island indicates potential distribution beyond the island, while strong ties emerge with 'ndrangheta especially for the cocaine trade. For example, the DIA (2020b) reports the seizure of 100 kg of marijuana intercepted by the *Guardia di Finanza* near Varese (north of Italy), hidden in a van boarded from Sardinia. A load of cannabis from Sardinian production (more than 200 kg) was found near Berlin by local police officers, along with other agricultural products (DIA, 2022a). Besides, foreign criminal groups, particularly Nigerians, are involved in drug trafficking and smuggling (DIA, 2023).

Similarly, Sardinia has experienced an intensification of investments aimed at money laundering, especially in the tertiary sector related to commerce and tourism (Mazzette et al., 2022; DIA, 2023, PCAC, 2024). As reported by the DIA (2022b), the *Fenice* investigation revealed the interest of the 'ndrangheta in purchasing several apartments in a holiday resort in Olbia, in addition to the confiscation of properties of a Campanian entrepreneur considered the link between the economic interests of at least three *Camorra* clans (*Mallardo*, *Di Lauro*, and *Puca*). In the *Marghine* investigation, the *Carabinieri* of Cagliari executed a restrictive measure

against a Sardinian-Calabrian organisation active in the *San Luca* area (RC) that monthly used to send 5 kg of cocaine to the island (DIA, 2022a).

3. Method

The calculation of the potential economic value of seized drugs involves several key steps. First, a daily review of the main Sardinian newspapers was conducted (2017m1 to 2022m12) to track drug seizures related to trafficking and dealing. "Trafficking" involves significant quantities and organised networks, while "dealing" refers to retail sales of small amounts to consumers. Hence, data on seized money and quantities of different drugs were extracted. Quantities were converted to grams (i.e., cocaine, hashish, heroin and marijuana), and doses for synthetic drugs. When precise quantities were unavailable, descriptive terms from the journalist were used (e.g., minor, discrete, large). Finally, the drug quantities were converted to a common unit and cross-referenced with price data from the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2022; for missing data, the previous year's price was used to create a balanced dataset). This provided a comprehensive overview of various drug types seized over the analysed time frame, aiding in the calculation of their potential economic value at a municipal level. Hence, the total monetary amount for each SLL was calculated per 1,000 inhabitants, using population data from ISTAT (various years). During the span of time considered, as expected, among seizures, marijuana was the most prevalent (92.2%), followed by hashish (6.4%). Other types of drugs were relatively minor, with cocaine making up 1.2% and heroin accounting for 0.2% of the total. Besides, information on simultaneous weapons seizures is also gathered as a complementary crime.

The biplot serves as an effective graphical tool for analysing cross-sectional and multivariate datasets (Gabriel, 1971). It helps extract innovative and useful information for various stakeholders. It identifies intrinsic relationships, presenting complex data in an immediately readable format. It visualises both highly correlated indicators and observations in a low-dimensional space. Data distribution does not rely on predefined assumptions, and indicators are standardised to reflect a normal distribution with a mean of zero and a variance of one (Gallego-Álvarez et al., 2013; 2015).

A scatter biplot comprises three distinctive elements. First, the extracted factors via a Principal Component Analysis (PCA) are represented by the cartesian axes. Typically, the two main dimensions capture most of the data

variation. Second, a set of arrows symbolise the variables under investigation. The arrow length reflects the variable's contribution to overall data variation (i.e., longer arrows indicate a greater contribution to variability, and vice versa). The arrow direction reflects the relationship and covariance structure with other variables. High correlation, or similar behaviour, is represented by arrows with nearly parallel directions. Orthogonality or independence is shown by nearly perpendicular arrows (90° angle). A negative correlation is shown by arrows pointing in opposite directions. Third, the points are a representation of the units (in this case, the LLS within each province). The proximity of points to a particular arrow indicates similarity and a strong association. Conversely, points distant from arrows suggest unique values, or even outliers in the dataset.

4. Results: dynamics and trends

The following sections present the empirical results for the multivariate analysis by year of observation (2017:1-2022:12). based on the LLS (Figure 1).

Figure 1. Local Labour Systems (LLS), Italian region of Sardinia



Source: elaboration OSCRIM, on ISTAT definitions

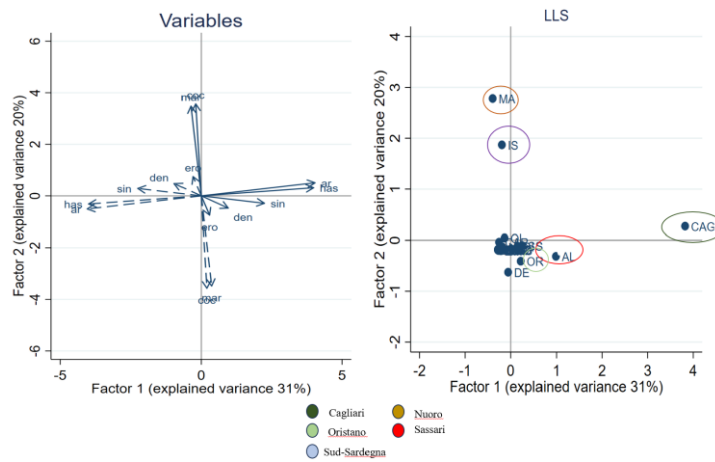
For the biplot analysis the LLS are also grouped by provincial administration, that is: Metropolitan City of Cagliari, Oristano, Sud-Sardegna, Nuoro, and Sassari. Table A.1. provides full details of definitions and acronyms of SLL and matching with the related provinces.

This representation illustrates the evolution and dynamics of drug seizures in Sardinia. The standardized variables include seized money (namely *den*), the economic value of cocaine (*coc*), heroin (*ero*), hashish (*has*), marijuana (*mar*), synthetic drugs (*sin*), and the quantity of seized weapons (*ar*) of different kind (i.e., knives, pistols, rifles, machine guns, machetes, hand grenades, ammunition, burglary tools, crossbows, sickles, and katanas).

4.1 Year 2017

Figure 2 details the variables and LLSs for the first year of observation (2017) from January up to December.

Figure 2. Standardised variables and LLS (biplot 2017:1 - 2017:12)



Note: seized money (den), cocaine (coc), heroin (ero), hashish (has), marijuana (mar), synthetics (sin), weapons = (ar)

Significant drug seizures and criminal activities were reported across various provinces of Sardinia. In the Metropolitan area of Cagliari (CAG in Figure 2), significant seizures included 400 kg of hashish hidden in crane counterweights, a kilogram of hashish in blocks, and two kilograms of marijuana. Operations also yielded 250 grams of dynamite gel with detonators, a sawed-off double-barrel shotgun, a 9mm pistol, and various types, suggesting a couple's involvement in safeguarding explosives, weapons, and drugs for others (U.S., 2017). Besides, 36.502 kg of cocaine valued at nearly 3 million euros were seized, including 12 kg of high-quality cocaine and 4,300 euros in cash linked to local drug dealing. These events were underscored by the Court of Appeal of Cagliari's report, detailing organised drug activities in the city's densely populated neighbourhoods from July 2017 to June 2018 (PCAC, 2018).

For illegal activities linked to marijuana trafficking, the most impacted LLS is Macomer (MA, Nuoro province). Specifically, two quintals of marijuana ready for sale were seized at a farmhouse in a nearby village (N.S., 2017). In an uninhabited house in another downtown, 410 kg were found hidden in feed bags already prepared for distribution (N.S., 2017).

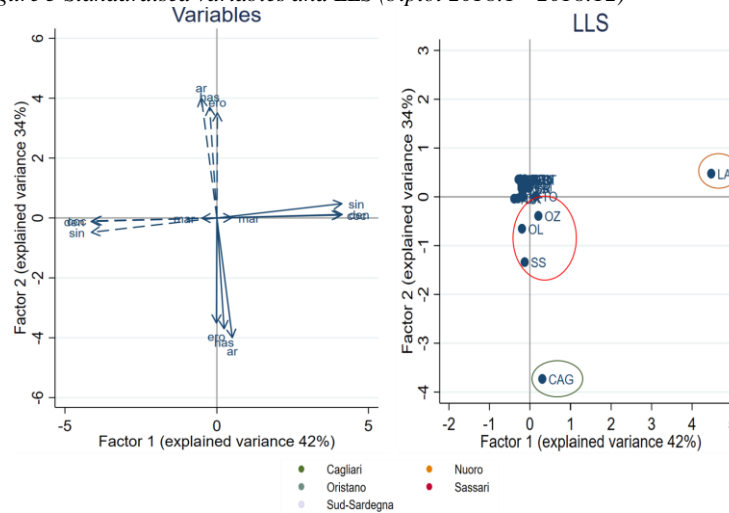
In Isili (see IS in Figure 1) five kg of pure cocaine were intercepted, highlighting ongoing drug trafficking activities in the Sud-Sardegna province. Besides, Alghero was noted for synthetic drugs, where an arrest involved ecstasy possession and firearms.

Throughout these criminal activities, the President of the Court of Appeal of Cagliari highlighted the widespread impact of organised criminal groups, particularly affecting urban areas amidst challenges in territorial control. The cultivation and distribution of marijuana emerged as a significant aspect of the drug trade, often linked to local family networks and escalating complementary criminal activities targeting also local officials (PCAC, 2018). Nuoro province is under scrutiny for intimidation, which is more prevalent than in other provinces. While still predominantly local, these incidents are often directed at local administrators to influence public decisions, or as personal retaliation (DIA, 2018a).

4.2 Year 2018

Figure 3 provides a photograph that details the variables and LLSs for the in 2018 (January – December)

Figure 3 Standardised variables and LLS (biplot 2018:1 - 2018:12)



Note: see Figure 2 for acronyms

Once again, Cagliari's Metropolitan area (CAG in Figure 3) shows seizures of hashish and firearms, with heroin also involved in the authorities' operations. A total of 231.72 kg of hashish, valued at 2,470,104 euros, was found. Significant seizures included 90 kg found in the neighbourhood of the city; besides, a search revealed two boxes containing 45 kg of hashish blocks and led to the arrest of a 42-year-old with no prior convictions (N.S., 2018). Additionally, 35 kg of hashish, hidden in a luxury condominium's wall shelf, yielded cocaine, cash, and ammunition (N.S., 2018). Operation *Pintadera* identified 32 individuals managing sales of hashish, cocaine, heroin, and methadone in urban areas of Cagliari. These locations, resembling fortified bunkers with reinforced doors and advanced surveillance technology, facilitated around-the-clock drug sales using lookout systems to conceal merchandise in sewer outlets. The drugs were also sold to students near schools (Questura di Cagliari, 2018). Operation, *Grande Fratello*, uncovered 14 individuals generating two million euros monthly worth of drug smuggling (U.S., 2018).

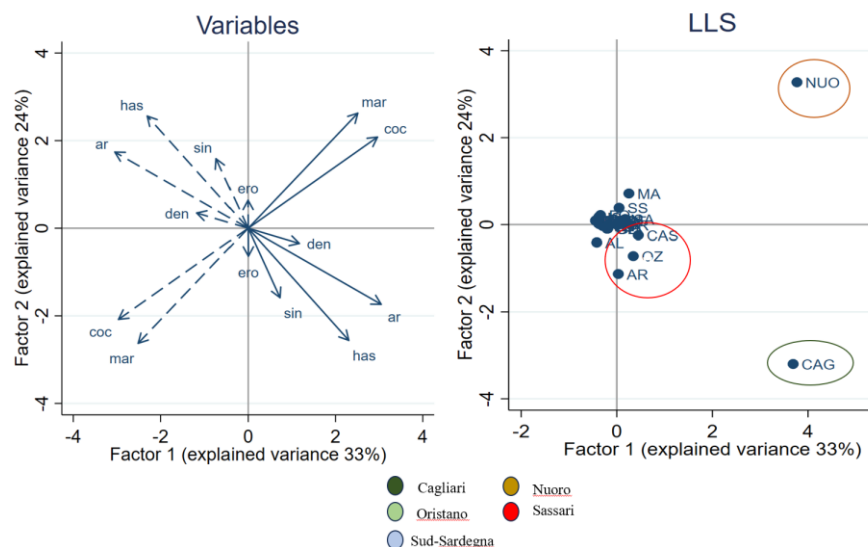
In Sassari (SS), a heroin distribution hub was found near the police headquarters, leading to the arrest of two Nigerians with packaging materials (N.S., 2018). In Ozieri (OZ), authorities confiscated several grams of cocaine, heroin, and marijuana from a 25-year-old's residence, along with cash and packaging tools, despite no prior criminal record (N.S., 2018). The Italian Antimafia Investigation conducted a major operation targeting 19 individuals involved in large-scale marijuana and cocaine trafficking, distributing even to teenagers in the peripheral town of Ozieri through gaming venues, using lookouts to evade law enforcement (DIA, 2018b). In Olbia, authorities seized nearly 500 grams of hashish, two precision scales, and 1,000 euros in cash from a temporary young lodger from the south of the island with prior convictions (N.S., 2018). The Financial Guard apprehended a 31-year-old Italian resident with 400 grams of hashish upon arrival from Cagliari, highlighting regional dynamics and cross-regional interactions.

Besides, the findings for Lanusei in the Ogliastra province align with the President of the Court of Appeal of Cagliari's report (PCAC, 2019), remarking extensive drug trades across Sardinia's urban and rural areas. Notably, the Court also underscored ongoing criminal cases in Lanusei and Ogliastra, including property, urban planning, and environmental crimes. Anti-drug operations now span coastal and rural areas, highlighting increased synthetic drug use risks, especially among youth. Amid socio-economic challenges, drug trafficking profits rise through strengthened national and international criminal connections.

4.3 Year 2019

Figure 4 shows a different geographic distribution compared to previous years.

Figure 4 Standardised variables and LLS (biplot 2019:1 - 2019:12)



Note: see Figure 2 for acronyms

Nuoro (NUO) stands out for marijuana and cocaine, as shown in the upper right quadrant. The province of Sassari, with the SLLs of Castelsardo (CAS), Arzachena (AR), and Ozieri (OZ), shows a prevalence of heroin, synthetic drugs, and seized money. The Metropolitan City of Cagliari once again stands out especially for hashish and weapons (*ar*). Operation *Proserpina* revealed an ethnic consortium distributing drugs in Cagliari, Sassari, and Nuoro, involving locals and foreigners (DIA, 2020a). The PCAC (2020) reported increased criminal activities in Cagliari, utilising public properties as logistical bases and involving also teenagers. A notable case in the neighbourhood of *Is Mirrionis* led to convictions of an organised group, including minors. Operation *Via Roma*, concluded in January 2020, resulted in the arrest of eight Gambians and two Senegalese for hashish dealing in the maritime area.

In Nuoro, authorities seized over 702 kg of marijuana and 2.5 kg of cocaine. The largest seizure (700 kg) occurred in the inner town of Orgosolo, where the drugs were meticulously stored to prevent humidity damage. The same operation recovered weapons, explosives, and 13,000 euros in cash, along with 59 Roman coins. Another notable seizure involved 2.5 kg of cocaine near Oniferi. As noted by PCAC (2020), for the judicial year 2019, various crimes in Nuoro are linked to drug trafficking and distribution. These include traditional criminal activities (e.g., use of violence) as well

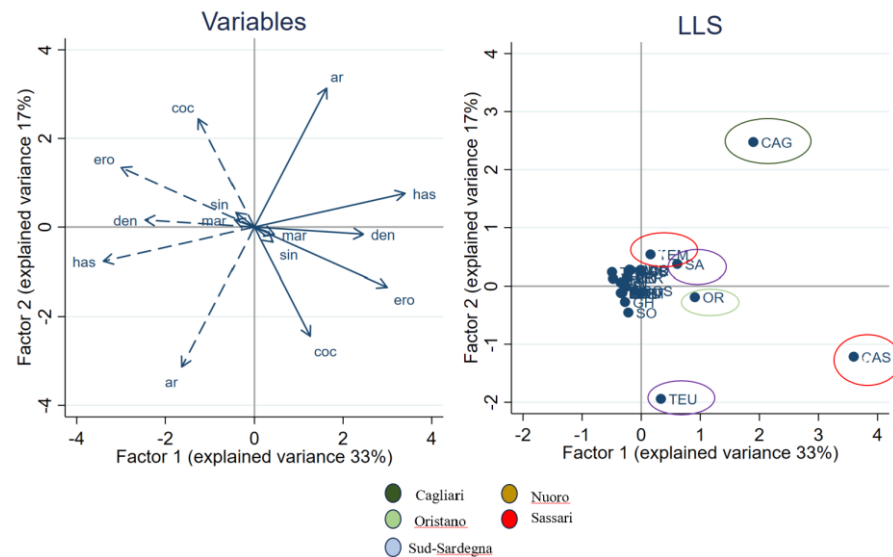
as those with significant economic impacts, sometimes targeting public administration. Additionally, there has been an increase in environmental crimes, particularly related to waste management, and in the construction sector (e.g., illegal dwellings). Due to the widespread nature of these issues, a specialised section has been established, involving collaboration between the forest guards and the judiciary in Nuoro, to address these crimes promptly and effectively.

In Castelsardo (north-west), 171,910 euros and drugs were seized, including 125,000 euros hidden in a gym's ceiling. Sassari authorities found a "minimarket" of drugs, arresting a Nigerian couple with heroin hidden in a Bible. In Ozieri, a teacher was arrested while transporting 20 kg of drugs. In Arzachena, several drug arrests were made, including a 32-year-old in La Maddalena with 71 grams of hashish. Operation *White Gold* in La Maddalena resulted in six arrests for hashish possession, and in Palau, a 31-year-old was found with various drugs in a hotel room. The DIA (2020a) remarked Sardinia's strategic location makes it a hub for international drug trafficking, with imports from Spain and North Africa and exports of cannabis derivatives. Besides, drug trafficking is also linked to human trafficking, managed by Nigerian mafia networks using low-paid couriers.

4.4 Year 2020

In 2020, despite the COVID-19 pandemic, drug-related crimes persisted in Sardinia, although with some regional variations. Compared to the previous cross-sections, the explained variance by the two factors does not exceed 50% (Figure 5).

Figure 5 Standardised variables and LLS (biplot 2020:1 - 2020:12)



Note: see Figure 1 for acronyms

In the Metropolitan City of Cagliari, significant seizures included 35.7 kg of hashish and numerous weapons. A 20-year-old was arrested with 8 kg of hashish and a 70-year-old for possession of explosives, firearms, and drugs. In Sanluri (SA), a 44-year-old, known for local drug distribution, was arrested with substantial amounts of cocaine, hashish, and marijuana, hidden throughout his property. In Tempio, a 28-year-old was apprehended with a variety of drugs, explosives, and cash, and evidence of organised distribution.

In Teulada (TEU), a 39-year-old was caught with over 2 kg of cocaine, one of the largest seizures in the area, likely destined for the Sulcis Iglesiente market. Environmental crimes, especially related to waste management and illegal construction, also saw a dramatic increase highlighting the multifaceted nature of criminal activities in the region. Notably, the environmental impact of military exercises at Capo Teulada was also under investigation (PCAC, 2020).

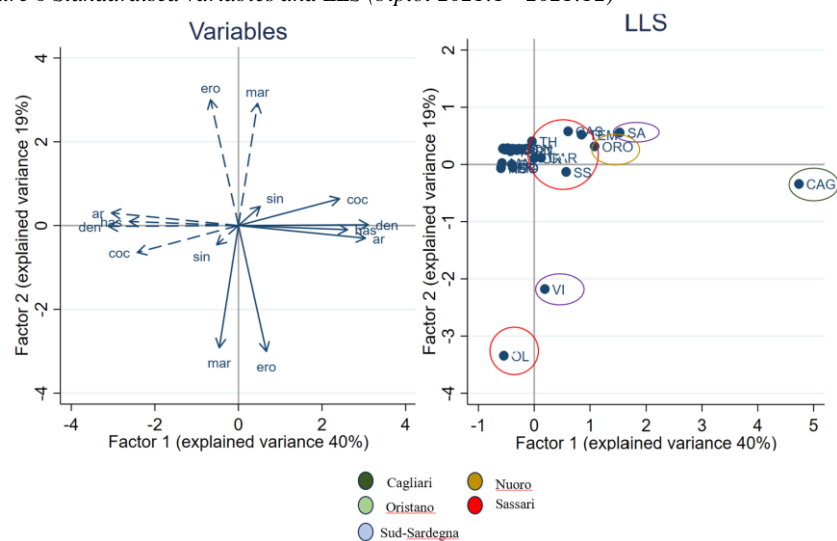
In Castelsardo (CAS), 2 kg of heroin and marijuana were seized from an immigration reception center. In Oristano, authorities intercepted 54,360 euros suspected to be drug trafficking and found large quantities of marijuana and cocaine. The *Drug & Fire* operation in Oristano, Santa Giusta, and Fordongianus (OR) led to the arrest of 12 individuals involved in drug traf-

ficking, and indoor cultivation. Additionally, in this area there is an increase of extortion against insolvent buyers (U.S., 2020).

4.5 Year 2021

Although 2021 heavily influenced by the pandemic, Figure 6 shows a rebound in criminal activity, both statistically (with 59% of the variance explained) and in the spread across the island.

Figure 6 Standardised variables and LLS (biplot 2021:1 - 2021:12)



Note: see Figure 2 for acronyms

The Metropolitan City of Cagliari (CAG) is notable for seizures of hashish, weapons, and money derived from drug trafficking. Authorities confiscated 364,849 euros and 26.371 kg of hashish valued by the authorities at 335,966 euros. Arrests included a 42-year-old employee and a 33-year-old vendor, with 20 kg of hashish found in a storage apartment. In the near town of Capoterra, a drug circle run by youths was dismantled, with seizures including 4 kg of hashish, 2.4 kg of cocaine, 128,000 euros in cash, and a P38 pistol. In the *Dogs Square* investigation, a well-organized criminal group managed drug dealing in the city, coordinated by a couple overseeing a network of 40 individuals with various specialisations: "suppliers, couriers, cutters, pushers, lookouts." The Carabinieri commander empha-

sised that "Everyone had a role, even minors. And there were those who took care of preventing interference with heavy acts of intimidation" (U.S., 2021). The *Good Life* operation uncovered drug trafficking and money laundering activities in Cagliari, Elmas, and Sinnai, with luxury items and high-quality drugs destined for wealthy clients.

The SLL of Olbia (OL) stands out for marijuana trafficking, with 857 kg found in two warehouses in Telti and another 90 kg in city of Olbia. Investigations suggest Olbia is a logistics base for marijuana storage before shipping (N.S., 2021).

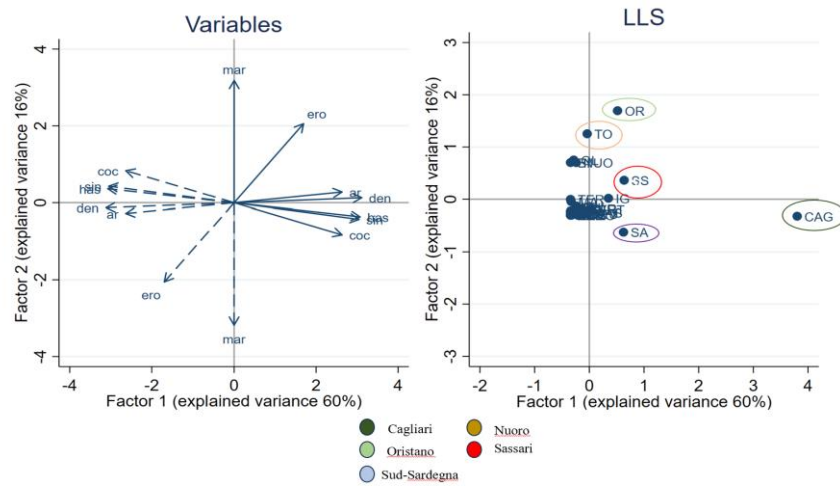
In Villacidro (VI), two significant drug and weapon seizures were reported in Guspini, including heroin, marijuana and hashish. In Sassari, a notable quantity of heroin was seized from a Nigerian gang.

Other areas include Castelsardo (CAS) with 500 grams of cocaine and Valledoria for a family-run drug trafficking. These cases highlight an international connection to Sardinia involving individuals from Venezuela and Spain. Tempio (TEM) saw seizures of MDMA, ketamine, and cocaine. Sanluri (SA) reported a significant cocaine seizure and arrests (N.S., 2021). In Orosei (ORO), drug seizures included cocaine, marijuana, and hashish from local shepherds using encrypted messaging apps for communication.

4.6 Year 2022

The final year under observation offers a diverse overview of the dynamics of illegal activities (Figure 7).

Figure 7 Standardised variables and LLS (biplot 2022:1 - 2022:12)



Note: see Figure 2 for acronyms

The Metropolitan City of Cagliari (CAG) stands out for most of illegal activities and again shows a certain association with the SLL of Sanluri (SA) in South Sardinia. In Quartu, 600 grams of heroin and cocaine were seized from the home of a 31-year-old Nigerian with no prior convictions (U.S., 2022). In the area between Pula, Sarroch, and Capoterra, approximately 17 kg of drugs were uncovered. In the home of two young people, 16.2 kg of hashish, 142 grams of cocaine, 150 grams of heroin, and 220 grams of ecstasy together with over 26,000 euros in cash, as proceeding from drug dealing, were found (N.S., 2022). In Vallermosta (SLL of CAG), 342 kg of marijuana were found hidden in two different livestock farms, respectively in an underground tank and a rocky crevice. The product had already been dried and packaged in bags of about 1 kg. If this quantity had been placed on the market, it could have yielded around 1.4 million euros (N.S., 2022). In this territorial area, the presence of "extraregional alliances" related to camorra, engaged in money laundering in the legal economy, was noteworthy, as reported in the *Omphalos* operation. Overall, law enforcement confiscated 36 million euros from a businessman working on behalf of the camorra. The alliance of Neapolitan (Mallardo, Di Lauro, and Puca) and Caserta clans had also invested in tourism infrastructure in the Cagliari area, as well as in Gallura. Additionally, the businessman managed car sanitisation during COVID-19 pandemic, commercial establishments, and hospitality structures in Emilia-Romagna and Marche (DIA, 2022b).

In Sardara (SLL of Sanluri, SA), during a checkpoint on the 131 highway, an unsuspected food product trader who personally imported products from Spain was arrested. Hidden in the battery of his luxury car, which was reduced to its internal components and could only be used to start the engine, 5 kg of pure cocaine were found. Besides, in the SLL of Sanluri, in an abandoned house, jointly with some pistols and cartridges, the Carabinieri found eight blocks of hashish weighing a total of 770 grams (N.S., 2022).

The SLL of Tortolì (TO, upper right quadrant) stands out for marijuana (mar). In the countryside of Talana, hidden in a scrub, over 12.6 quintals were recovered by the military in two separate seizures. The retail economic value of this amount would have been around 11 million euros. In one case, 60 kg already dried were stored inside some barrels (N.S., 2022). In the other case, the drug, in excellent condition, was distributed across three distinct sites a few dozen meters apart. Over 1kg was hidden in 34 plastic barrels, containing marijuana already packaged in vacuum-sealed bags, ready for sale, and ten white nylon sacks containing the substance still to be packaged (N.S., 2022).

In the SLL of Sassari, in a historic city center 3 kg of drugs (heroin and cocaine) and nearly 12,000 euros in cash were found. Additionally, an illegally possessed weapon with its ammunition and hundreds of stolen items were recovered (U.S., 2022). The SLL of Oristano showed a significant impact. In Tramatza, in a warehouse of a 25-year-old's farm, 550 kg of marijuana ready for sale were found inside 70 feed bags. If placed on the market, the drug would have yielded over 2.5 million euros (N.S., 2022). In Riola Sardo (OR), the Carabinieri seized a wide range of drugs. They found more than 1 kg of marijuana and other drugs (cocaine, heroin, hashish, and ecstasy). Additionally, during the search, they found a bomb, 23 firecrackers, and around 3 thousand euros (N.S., 2022). The Prosecutor of the Republic of Oristano noted how the map of the drug business is experiencing significant changes in the province, with expansion from the eastern to the western areas of Sardinia. Over time, Oristano has become a place of cannabis production and a hub of illegal trafficking, associated with an increasing "fragmentation of drug dealing even in peripheral and limited areas." This territory shows population basins that derive their exclusive income from drug dealing activities (U.S., 2021).

5. Conclusions

Sardinia has become a significant hub for intercontinental drug trade and trafficking, serving as a key site for production, transformation, storage, import-export and distribution of narcotics (DIA, 2019b; 2023). The island's cannabis production is partly destined for export, linking local cultivators with supra-regional criminal organisations. Local crime has shifted focus to drug trafficking, often tied to robberies and assaults on valuable vehicles as additional income sources (PCAC, 2022; 2023).

As addressed also by the biplot analysis, from January 2017 up to December 2022, different territories in Sardinia show specialisations in transforming drugs to increase their value, such as producing high-potency cannabis oil and converting marijuana into hashish (N.S., 2022). Sardinia also serves as a transit and temporary storage point for drugs bound for other markets (DIA, 2021a; 2021b). Despite its socio-economic disadvantage, tourism activity attracts investments, leading to organised crime infiltrating profitable sectors and public-funded projects (PCAC, 2020; 2023).

As shown by the empirical analysis, a common element across all the years under investigation is the high correlation between hashish and weapons which are strongly tied in the Metropolitan City of Cagliari. Likewise, for the other indicators, there is a certain temporal and territorial volatility that possibly mirrors different trading routes and alliances.

Youth involvement in drug activities has increased, often resulting in family violence and extortion to finance their drug usage and dealing. Notably, drug consumption and illegal activities span all social strata, indicating a complex phenomenon requiring accurate and systematic information for effective policy interventions and deterrence (PCAC, 2022).

Sardinian criminal groups are increasingly connected with national and international mafia organisations, adopting their organisational models and infiltrating the legal economy through money laundering (DIA, 2022a; PCAC, 2024). Addressing these rooted criminal activities requires comprehensive research and societal efforts to mitigate their medium- to long-run impacts.

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APPENDIX A

Table A.1 Local Labour Systems, acronyms and related provinces.

Local Labour Systems	Acronym LLS	Province
ALGHERO	AL	SASSARI
ARZACHENA	AR	SASSARI
BENETUTTI	BE	SASSARI
BITTI	BI	NUORO
BONO	BON	SASSARI
BOSA	BOS	ORISTANO
BUDDUSÒ	BU	SASSARI
CAGLIARI	CAG	CAGLIARI
CARBONIA	CAR	SUD SARDEGNA
CASTELSARDO	CAS	SASSARI
DESULO	DE	NUORO
FONNI	FO	NUORO
GHILARZA	GH	ORISTANO
IGLESIAS	IG	SUD SARDEGNA
ISILI	IS	SUD SARDEGNA
LANUSEI	LA	NUORO
MACOMER	MA	NUORO
MURavera	MU	SUD SARDEGNA
NUORO	NUO	NUORO
NURRI	NUR	SUD SARDEGNA
OLBIA	OL	SASSARI
ORISTANO	ORI	ORISTANO
OROSEI	ORO	NUORO
OZIERI	OZ	SASSARI
PERDASDEFOGU	PE	SUD SARDEGNA
SAN TEODORO	SA	SASSARI
SANLURI	SE	SUD SARDEGNA
SANTA TERESA GALLURA	SI	SASSARI
SASSARI	SO	SASSARI
SEUI	SS	NUORO
SINISCOLA	TEM	NUORO

SORGONO	TEO	NUORO
TEMPIO PAUSANIA	TER	SASSARI
TERRALBA	TERT	ORISTANO
TERTENIA	TEU	NUORO
TEULADA	TH	SUD SARDEGNA
THIESI	TO	SASSARI
TORTOLÌ	VI	NUORO
VILLACIDRO	STE	SUD SARDEGNA

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