

## **The Digital and Physical Footprint of Dark Net Markets**

**Felipe Thomaz**

*Associate Professor of Marketing*  
*Saïd Business School, University of Oxford*  
**[Felipe.thomaz@sbs.ox.ac.uk](mailto:Felipe.thomaz@sbs.ox.ac.uk)**

## **Abstract**

Over the past decade, the world has been contending with a growing set of challenges relating to illicit traffic as advancements in technology, communications, and global integration facilitates the operation of black markets and towards greater organization of criminal activity. In this study, the dark web and associated dark net markets are introduced as an important context for scholars interested in international marketing. Furthermore, the scale, scope, and structure of the real-world drug trade is empirically analysed, as an example of the work possible within this arguably dark world. And finally, the study concludes by highlighting key themes from the literature in international marketing scholarship and focuses on how they might be co-opted to contributions towards the understanding and counter-marketing of illicit systems of exchange.

**Keywords:** Dark Web, Black Markets, Illicit Trade, International Trade, Social Network Analysis

“International marketing is a rich field in terms of the problems and issues addressed, due in part to the complexity and multiplicity of forces in the international environment and their impact on marketing practices and the development of international firms” (Constantine S. Katsikeas, *Journal of International Marketing* Editorial Statement 2018)

As the opening quote illustrates, the field of international marketing deals with a significant and growing amount of complexity as the realities of marketing and firm operations interact with international environmental factors. Furthermore, as these scenarios are met with the rise of global business, the liberalization of national trade policies as well as the advances in communication and information technologies (Cateora & Ghauri, 2000; Katsikeas 2003), international marketing scholars will have to grapple with an evolving set of issues.

Among these, lies the rise and expansion of digital black markets (or dark net markets, DNMs) residing on the dark web, as well as the accompanying real-world international shipments and trade in illicit goods. Facilitated by the aforementioned advancement in communications and information technology (and specifically privacy enhancing technologies like The Onion Router, Virtual Private Networks, Digital Currencies, End-to-End Communication Encryption), DNMs facilitate the trade of a myriad of illicit goods, from drugs and weapons, to digital assets (e.g. stolen identities, credit card and bank account numbers), to human exploitation, trafficking and beyond. These markets reside in the dark web, a disconnected and non-indexed component of the greater World Wide Web that requires specialized browser software for access. In essence, this means that services and markets residing in the dark web cannot be searched-for via traditional methods, nor can they be stumbled upon by accident, but rather that they required a previously provided address (which can itself change with some frequency), and thus provide a measurable degree of privacy and protection for their users.

And like much of modern digital technology, these markets also provide for significantly less friction in communication, collaboration, and trade for vendors and consumers across national borders. Similarly, their growth has been significant, with the first major DNM (Silk Road) being seized and shuttered by law enforcement in 2013, only to be subsequently followed by a total of 175 large DNMs. Additionally, in evidence of a growing user base, the Global Drug Survey (2019) reports that 25% of individuals having accessed DNMs this year are newcomers to the environment. Unsurprisingly, the shifts in this digital environment are then also felt in the real world, as sales and arrangements made in the DNMs are carried out in reality. The United Nations warns that these digital environments allow for the social discovery of new and different drug offerings (i.e. a buyer might seek Cannabis, and ultimately order Opioids, as a consequence of curiosity along with the ease of ordering). Anecdotally, the current Opioid addiction and death crisis in the midwest of the United States has been connected to the ready availability of cheap opioids like fentanyl. Simultaneously, the increased law enforcement attention towards those substances has forced some DNMs to disallow the listing of such drugs in a bid to avoid unwanted focus from law enforcement. These exchanges suggest that the connection between digital and physical illicit trade is consequential.

As such, this study seeks to contribute to the literature of international marketing in three distinct ways: first, it introduces the environment and international scope of the dark net market illicit trade environment and context; second, it empirically demonstrates the scale, scope, and structure of the global drug trade (which is leveraged as just one example of the total sum of all illicit trade); and finally, it aims to motivate a mindset and approach whereby international marketing scholars can adapt and contribute their expertise towards an underexplored market, both as a means to enhance and expand theory, but also lend aid

towards the disruption of criminal systems of exchange in a strong form of counter-marketing (Gundlach, Bradford, and Wilkie 2010).

The paper proceeds with a discussion of the proposed mindset and associated lens whereby scholars interested in international trade might view this criminal activity, and then introduces the dark web environment as well as an empirical analysis of the international drug trade.

### **A Shift in Perspective**

Broadly speaking, marketing scholars are concerned with, and are experts in systems of exchange. Certainly, each individual might concentrate their work on narrower questions and subcomponents of larger systems, but if we were to begin to paint a picture of the field with the broadest possible brush, it should be uncontroversial to suggest that we're embedded in processes of exchange. Even upon layering the additional complexity of international systems over these processes, we're still left with similar core questions. And our audience also remains somewhat similar: managers, consumers, policy makers. The field, again in the broadest terms, explains growth in these systems of exchange, and is concerned with the processes and mechanisms by which decisions (consumer or managerial) are made, and their consequences.

It is natural then that the growth mindset dominates the discussion, and the countervailing actions related to demand reduction, market shrinking, de-marketing, and counter-marketing (Gundlach, Bradford, and Wilkie 2010) have historically received less attention. Accordingly, questions around undesirable systems of exchange, or those around the consumption of illicit or questionable goods have similarly received little attention. That is not to suggest that our literature has been entirely quiet on the subject. There is a healthy stream of work on Digital Piracy (Jain 2008), whether that involves music (Sinha & Mandel

2008), film (Danaher et al 2010), software (Givon et al 1995), or other counterfeit goods (Wilcox et al 2009). Similarly, we have considered Gray Markets (Duhan & Sheffett 1988).

However, the aforementioned work does not embrace on core concept that should form the basis of a new proposed perspective on these environments: illicit trade is Big Business. For instance, the projected value of illegal trade on pharmaceuticals suggests a market of US\$200 Billion (Redpath 2012) in 2012, which if placed in proportion of other drug trades and accounting for an observable growth rate of digital markets, suggests that current illicit trade is equivalent to roughly a US\$900 Billion per year shadow economy.

Regardless of the 'trade good' in questions, whether drugs or arms, humans, or darker services; the motivation of the groups supplying the good remains the same: profit. Ultimately, what we observe in this environment is the result of organization and coordination of groups of individuals seeking to meet market demand for a multitude of goods in the pursuit of profit, taking in consideration both consumer, competitive, regulatory, and environmental factors.

Ultimately, that recognition should be comforting to marketing scholars, as it describes precisely the systems of exchange over which they have domain expertise. However, just as the devil is in the details, the applicability of existing knowledge is conditional on the similarity of contextual conditions and pressures on the illicit systems. For that, one must recognize that anyone operating in this environment cannot rely on standard institution protections (e.g. contracts, court), and that law enforcement exists as a constant force seeking to identify and disrupt operations, usually at a very high cost to individuals (e.g. fines, incarceration). This system is additionally made complex by the uneven application of (international) regulation, such that the meaning of "illegal" can be fluid as a function of time and place (e.g. parts of the United States have recently legalized Cannabis, but up until 1965 birth control was illegal, and a black market good, in the United States).

The second recognition should be the aforementioned organization. It should not be surprising that trade at the scale discussed above involves coordination, as evidenced by the existence of gangs and cartels as well as the opposing forces like the United Nations Office on Drugs and Crime (UNODC) and the Global Initiative Against Organized Crime. For the purpose of marketing scholars, the shift should be in realization that these are not traditional criminal organizations, but rather large and significant business organizations. In fact, the map onto known structures of entrepreneurship, to SMEs, to Multinational Enterprises and holding companies. The striking difference being the lack of institutionally granted and recognized status. They are, however, as formal and organized, and like most things in this environment, they operate as a dark mirror of frequently studied entities. In that way they could be seen as Shadow Multinational Enterprises (SMNEs), whose activities are felt and observed, but whose operation and organization are otherwise hidden.

Altogether, this coalesces into a suggested perspective and associated lens for marketing researchers interested in understanding the illicit world of the dark net markets (DNM), the dark web, and global trade in illegal goods. First and foremost, this is familiar ground of big business, with intelligent and motivated profit seeking organizations. This is also familiar consumer grounds of decision making and interaction with technology, social systems, and the rise of digital platforms. A difference comes from the suggested lens through which one can view this system and potential contributions, specifically a “market hacker” lens. Much in the same way that a computer hacker uses their systems expertise to overcome problems and barriers, as well as sometimes developing exploits to subvert the system; a “market hacker” is an expert in systems exchange who leverages this knowledge to identify functionality, processes, and barriers in the market, sometimes with the view to

create exploits that subvert the system towards a desired outcome. In this case, a greater amount of friction, dysfunctionality, and overall cost in the global illicit trade.<sup>1</sup>

Lastly, it is worth pointing out that the transfer of knowledge suggested above is easily reverted as well. In the same way that expertise can be generated in standard markets and deployed to solve problems related to illegal trade and trafficking, so can work developed in black markets test boundaries of existing theory, generate managerial insights, and develop knowledge that can be applied and transferred to standard marketing practice (Thomaz, Salge, Karahanna, and Hulland 2020).

## **Dark Web**

As alluded to previously, the dark web is simply a portion of the world wide web. This environment is comprised of websites and services that cannot be reached normally via standard browsers, nor are they normally indexed by searched engines. Access is restricted by the requirement of specialized software (i.e. TOR, The Onion Router), and requires pre-existing knowledge. Namely, someone must provide the user with a specific address to visit once connected to the network.<sup>2</sup> Once in the dark web, a user would recognize that much of the environment is decidedly legal and similar to the surface web(that component we most frequently interact with), comprised of discussion boards, informational websites, and others that are hosted in the dark web specifically to provide greater privacy and anonymity to users. However, among these hidden services there are a number of illegal options as well, from forums dedicated to the trade of illicit digital content (e.g. child abuse videos), to minor

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<sup>1</sup> This is accomplished in collaboration with agencies who have been empowered to seek these goals. In this way, an academic can provide the expert knowledge of how to proceed in operations, and in the identification of barriers and exploits, but not in their execution.

<sup>2</sup> There are a number of ongoing efforts to index the dark web, thus making it more easily searchable. Navigation via supplied links is also possible and common, with a number of forums on the dark web providing curated lists of markets and services.



individual shops and massive markets that serve as platforms connecting a myriad of vendors and consumers.

Just as the world wide web exists across national borders, so does the dark web. In fact, this internationality creates one of the main frictions in efforts aimed at curbing illicit trade in the digital space, as most legally recognized organizations, institutions and regulations follow and are restricted by national borders. So, that while the aforementioned Shadow Multinational Enterprises enjoy some degree of frictionless coordination globally, law enforcement must work collaborate across borders to respond. For example, consider Operation Onymous, an international effort that was coordinated by Europol's European Cybercrime Centre (EC3), Eurojust, the FBI, and the U.S. Immigration and Customs Enforcement's (ICE) Homeland Security Investigations (HSI). This operation culminated in the arrest of 17 individuals and the seizure of Bitcoins amounting to US\$ 1 million, along with drugs, gold and silver. This collaboration, as a single operation, involved 17 countries: Bulgaria, Czechia, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Romania, Spain, Sweden, Switzerland, United Kingdom, and the United States.

While within the dark web, and specifically within DNMs, the visibility of location and direction of illicit flows is particularly challenging on a number of dimensions. One, is the trustworthiness of the available information. A core tenant of vendor and user behavior in these markets is the minimization of their actual digital footprint, and as such, identifying the truth of given information is problematic (i.e. if they don't default to not providing source/destination information, then they might well provide intentionally incorrect information). Relatedly, much of the existing information is as general as possible. For example, consider the item listing shown in figure 1. This is a listing that appeared recently in the Dream Market DNM offering a copy of the Pennsylvania Voter Registration database

(one of many such listings for every American state). As a digital offering, it is marked as both shipping from, and shipping to “worldwide.” In terms of analysis, this entry offers essentially no information about the flow of digital assets, where they are being held, how they were generated, and who the consumers might be. Similarly, the listing shown in figure 2 has an offer of 2.5 Kilograms of speed, shipping from Germany to anywhere “worldwide.” These types of listings do offer some insight on international flows, or at least sourcing (conditional on believing the provided information), but on an aggregate level, it leads to situation whereby all locations are connected to all other locations in a ‘complete’ system, thus further complicating analysis.

-----INSERT FIGURE 1 HERE-----

-----INSERT FIGURE 2 HERE-----

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One potential insight on the footprint and significance of DNMs on the globe comes from the United Nations Office on Drugs and Crime and its calculations on a yearly Global Drug Survey, where drug users are asked to indicate the proportion of drugs they source from the dark web. Figure 3 shows the results for sixteen countries, capturing the response of 57,937 individuals participating in a study around the consumption of illicit drugs. Among these results, it might be worth pointing out both the wide global footprint of represented countries, as well as the larger use of DNMs for sourcing in the United States and United Kingdom, which have often been pointed to as centers of DNM consumption due to particularly well-functioning mail systems that black markets rely on for distribution.

While this survey-based approach provides one initial sense of the scope of the global illicit trade, how then might scholars begin to shine a light on the structure and footprint of this market? To that end, this study turns to an empirical view of this market by leveraging observed drug trade patterns around the world.

## **Illicit Global Trade**

### **Data**

The data used in this study has been provided by the United Nations Office on Drugs and Crime (UNODC). The first dataset contains information on 619,183 ‘significant’ drug seizures between 2011 and 2016, which represents all of the currently available public data up to the most recent 2019 report by the UNODC. These records cover a total of 187 countries as well as 336 different drugs and format combinations (e.g. Cannabis plants, Cannabis resin, Cocaine, Fentanyl, Diezepam, etc). One must acknowledge that data resulting from the interception of drugs is biased in that we’ll be unable to observe those shipments that have been successful in evading authorities. However, this dataset represents the best currently available source of information on international drug trade, and we therefore assume that it is representative of the unobserved volume of transactions.

The UNODC provides a threshold guidance for the international reporting of drug seizures, such that their definition of ‘significant’ amount varies by drug, according to the following schedule: Opium, cannabis herb, cannabis resin and cannabis plants must be greater than one kilogram. Heroin, morphine, cocaine, and psychotropic substances should be equal to or greater than one hundred grams. Seizures referring to trafficking by mail or the discovery of new psychoactive substances are deemed significant regardless of quantity.

The UNODC also provided data (and associated graphs) on the on the prevalence of drug use globally at the country level. This data is accumulated by the office from a number of sources across a number of participating governments, via household and school-level surveys. Noted sources on consumption data include: Annual Report Questionnaire (ARQ), European School Survey Project on Alcohol and Other Drugs (ESPAD), Mediterranean School Survey Project on Alcohol and Other Drugs (MedSPAD), United Nations Children's

Fund (UNICEF), The Inter-American Drug Abuse Control Commission, Organization of American States (CICAD/OAS), Comisión Nacional para el Desarrollo y Vida sin Drogas, Peru (DEVIDA), World Health Organization (WHO), Mediterranean School Survey Project on Alcohol and Other Drugs (MedSPAD), as well as the Health Behaviour in School-Aged Children: World Health Organization Collaborative Cross-National Survey (HBSC).

### **Illicit Drug Trade Network Topology**

This Study leverages network analysis in order to empirically illustrate the scale, scope and construction of the international illicit drug trade. This methodology organizes a system as a network, defined as a set of nodes (e.g., individuals, firms, brands) and edges (i.e. the relationships between nodes); allowing for the examination of complex environments, and the consideration of information embedded in relational structures. As such, the focus is not placed on (only) the differences between individuals, but the manner in which they organize.

In this case, the nodes represent countries, and the edges represent the directed flow of drugs between countries, as quantified by the observed (intercepted) weight of illicit drugs shipped from a 'shipping' to a 'receiving' country. Note that the shipping country is not necessarily the country of origin, and that the relationship between countries **i** and **j** is directed, meaning that it is characterized by a value of flow from **i** and **j**, as well as the separate value of flow from **j** to **i**.

The resulting directed network captures the complex social structure between countries involved in the drug trade, and the arising topology can be described and explained via the following measures drawn from Wasserman and Faust (1994):

*Average Path Length.* A path describes the sequence of unique edges one travels between any two nodes in the network. The average path length is the average of the shortest path length between nodes for all possible node pairs. Sometime, as is the case in this network, a cluster of nodes has no linkage to other nodes or clusters (i.e. disconnected network), and in these scenarios only the main/largest connected component is considered, thus avoiding path lengths that equal infinity.

*Network Diameter* is defined as the maximal value among all of the shortest possible paths (as defined above) between any pair of nodes in the network.

*Graph Density* captures the cohesion of the entire network, and is given as the proportion of observed edges, divided by the maximum possible number of edges if all nodes were connected to all others. This maximum value is equal to  $N*(N-1)$  directed edges, where  $N$  is the number of nodes present in the network.

*Modularity* measures the maximal value of possible meaningful divisions in a network (Newman 2006) in order to segment the nodes into sub-communities that are highly interconnected, but that are otherwise sparsely connected with other sub-communities. This value also allows for the calculation of the *Number of Communities* present in the whole network.

*Degree Centrality* is a node level measure that provides one indication of the node's importance in the network. It is defined as the count of edges connected to the focal node. In this directed network, the degree centrality is also the sum of the nodes' *Indegree* and *Outdegree*, or the number of incoming and outgoing connections respectively.

*PageRank* provides an alternative measure of a node's importance in the network, resulting from an iterative algorithm that assigns higher values to nodes with a greater number of incoming connections from other high-value nodes (Page et al 1999). As a way of building intuition, the pagerank value can be seen as equivalent to the probability of stopping in that focal node after a set number of steps, if one started in a random node in the network and travelled outwards according to the direction and weight of edges.

*Betweenness Centrality* provides yet another measure of importance of a node to the network, albeit with potentially different interpretation and use. Betweenness is the frequency with which the focal node exists in the shortest path between two other nodes, for all possible node pairs. As such, this measure highlights the extent to which a node functions as an important intermediary along all possible efficient trade routes.

*Clustering Coefficient* captures a local (node, rather than whole network-level) variation of the density measure described above. It is given by the number of edges observable between the focal node's directly connected neighbors, divided by the number of total such links possible. Beyond cohesion, this value has been used as an indicator of the level of governance, the ease of information flows, and coordination (Thomaz and Swaminathan 2015).

## **Topology**

The values for the topology measures for two international drug trade networks is provided on table 1. The first network represents all observed transactions, is labelled as *unrestricted*. The alternative network, labelled as *restricted*, removes all edges that have a

value (total weight of shipped drugs) falling below 0.1% of the maximum edge value. This restriction serves as a simplification of the main *unrestricted* network, as it offers a drastic reduction in total edges (keeping the largest 5.66% of edges), and provides an additional lens focusing on the most significant countries and routes in the drug trade (by volume, being equivalent to those countries who've traded more than four metric tons across all 336 drug type/formats over six years, retaining 99% of all trade volume in that period).

-----INSERT TABLE 1 HERE-----

Considering the *unrestricted* network first, we see that there are 1,555 connections between the 187 countries, out of a possible 34,782 such possible connections if every country had been connected to every other country (i.e. a complete graph/network). This proportion of existing edges gives rise to our density measure: 0.045. Within this graph, we observe a total of three connected components; therefore, it is unconnected, and characterized by three distinct sub-networks that are unable to communicate/transact with each other. Among these sub-networks, the largest distance between two countries is six edges (the Diameter), but on average, a country can reach another in just under three edges (average path length = 2.909). These values are particularly interesting as they mirror other social systems. For instance, consider the popularized concept of “six degrees of separation,” wherein any individual can reach any other via six other connecting individuals. That statement is identical to saying a social system has a network of diameter 6, which incidentally is the exact number that we observe here.

Although the *unrestricted* network is naturally split into three components, it can also be segmented into eight distinct sub-communities via a clustering/segmentation analysis (modularity = 0.347), suggesting that the connectivity pattern explains an additional layer of country traffic behavior, above and beyond merely observed drug flows.

At a country level, we see that the average country is connected to 8.316 other countries, and that the average indegrees and outdegrees are therefore similar by construction (8.349 and 8.360 respectively). Additional indicators of country importance show an average PageRank of 0.003, or the equivalence of suggestion a random trip would stop on an average country with a 0.3% chance, while the highest value country would be more than ten times as likely to be the final resting spot on the random trip (PageRank = 0.034). Betweenness Centrality provides an alternative view of importance, specifically as it pertains to the frequency with which the country serves as a critical member in a path between any two other countries. The average country in the drug trade has a value of 0.015, while the country with highest betweenness is orders of magnitude more critical to the overall system, with a betweenness value of 0.244.

Perhaps for a view more grounded in reality, a ranking of specific countries according to crucial importance metrics might be useful. To consider major exporting countries, we would look at the weighted (by kilogram weight of intercepted shipments) outdegree in the network, which results in the following top five countries: Colombia, Morocco, Pakistan, Afghanistan, and Bolivia. Which is also perhaps the least surprising list possible, but a valid check of face validity that the network does in fact represent some real understanding of the world. On the other side of that equation, we have a list of the top importing countries, as given by the rank in weighted indegree: Spain, France, Egypt, Venezuela, and Italy. This list might be less obvious, unless one recognizes particularly porous ports of entry into the European block (Spain, France, Italy), as well as the Spanish status as one of the heaviest users of cocaine in Europe, as well as their increasing efforts in intercepting/seizing drugs (El Pais 2017).

Our other measures of importance are potentially more interesting. In terms of PageRank, we measure the importance with a view towards relevance and connectivity to



other important countries, which also capturing a somewhat dynamic view of flow between connected countries. In this measure, the top ranked countries are Spain, Russia, Bulgaria, Portugal, and Italy. Again, Spain and Italy are featured, which is not surprising considering their previously mentioned roles as importers. The appearance of Bulgaria and Russia is more telling, as they do not feature as sources or destinations, but are nevertheless important. And lastly, if we consider the betweenness centrality, our ranking is: Spain, Germany, Russia, Brazil, and Pakistan. Again, worth noting that in capturing the role to transmission countries, both heavy importers (Spain) and exporters (Pakistan) are featured, but otherwise unremarkable countries appear as particularly important in the coordination of international drug trade (e.g. Russia).

The whole system is visualized as a network in figure 4, and as a pixel picture in figure 5. The first provides an overview of all of the nodes and edges, as well as a representation of the distances and structures arising from the connectivity between countries engages in drug trade. The second provides a simplified view of the same data, being a representation of the adjacency matrix (a square matrix with alphabetized countries as rows and columns, and where each element takes the weighted value of drug shipments from the row-country to the receiving-column country). This pixel representation replaces the numerical value of each element in the matrix with a grayscale fill in a shade commensurate with the matrix normalized value it is replacing. While this approach is particularly useful in the analysis of dynamic network processes and limit objects, it is nevertheless presented here in static form as a useful way to consider the entire network at once, including both uneven off-diagonal triangles in the matrix.

-----INSERT FIGURE 4 HERE-----

-----INSERT FIGURE 5 HERE-----

Perhaps the most noticeable feature of the whole *unrestricted* network visualized in figure 4 is that it is incredibly cluttered, making any sort of inference rather challenging. This is the case even with a relatively small density value. There are so many connections between countries that visual inspection of the whole network in this traditional way offers little insight. Alternatively, one can consider the pixel picture representation of the data, shown in figure 5. Here, two broad statements are possible and valuable: (1) there is a meaningful diagonal line (top left to bottom right), and (2) the two off-diagonal triangles (created by this bisecting diagonal line) are not identical. The first statement highlights the amount of observed intra-country shipping that is not observed in the main graph (there would have appeared as self-loops from a node to itself). The second statement is a function of our structuring of the network as directed (i.e. not requiring a reciprocal or entirely dichotomous relationship between countries), and highlights the value this choice, as the information contained in this observable difference would have otherwise been lost.

However, in order to explore the graph of international drug flows in greater clarity, we examine the *restricted* network comprised of the top 5.66% edges (again, constructed by removing those edges that fall below a value of 0.1% of the largest observed edge-weight). The topology is provided in table 1.

The loss of smaller edges leaves the network with 88 meaningful connections and is reduced to 2 connected components. The smallest of these is a single dyadic pair of countries, with flows between Eswatini (formerly Swaziland) and South Africa. The other, more significant connected component contains 40 countries, and will be the focus of this continuing analysis. A visualization of this main connected component is provided in figure 6. Note that the removal of edges in this process also created 145 disconnected nodes, and therefore reduces our global network density from 0.045 to 0.003 (as the number of possible edges remain the same).

-----INSERT FIGURE 6 HERE-----

This restricted set of countries enjoys a significantly smaller network diameter, with the largest distance between any two countries being three steps. This obviously points to a significantly higher amount of concentration among the major participants in international drug trade. The number of observable sub-communities also decreases from eight to three, leading to the expectation of two distinct segments within the main connected component (the third belonging to the Eswatini-South Africa connection in the second connected component). In terms of efficiency, the average shortest path between any two nodes has also been reduced, now to a value of 1.5, which suggests an even greater level of accessibility between producers and consumers.

The visual representation in figure 6 points to some crucial roles played by Spain, Morocco, Belgium, and Pakistan. Ultimately, Spain's appearance is unsurprising here, as it featured heavily in the previous network, both as a key importer, and as a particularly important step in distribution paths. Similarly, Morocco and Pakistan had been noted before as valuable exporters, and their connectivity reinforces that ranking. Belgium occupies a potentially interesting position in the network, connecting three branches of the network that would have been otherwise unable to communicate/interact. As such, Belgium appears to be quite important in the international drug trade, despite an otherwise unremarkable set of characteristics. For reference, individual node metrics for the restricted network are given in appendix A.

In order to further ground this network analysis in reality, the network is projected onto the global map, providing a characteristic mapping on all international drug flows. This visualization (generated via flowmap.blue, Boyandin 2019) is presented in figure 7.

-----INSERT FIGURE 7 HERE-----

In this map, each circle represents the importance of the country, with empty circles denoting a greater outdegree (export) and filled circles denoting larger indegree (import). The edges, as in the graphs above, represent the amount of all illicit drugs flowing between countries.

As examples of additional analyses and further refined focus, figures 8 and 9 provide similar world map projections for the ego networks for Morocco and Pakistan, respectively. An ego network considers only the direct connections of a focal node, allowing us to concentrate on particularly important countries and relationships. In this case, it is worth noting the relative geographic restriction of Morocco's influence, but the significant volume of drugs flowing from that country into Spain. In contrast, Pakistan has a much greater geographic reach, touching into Asia, Africa, Europe, and North America.

-----INSERT FIGURE 8 HERE-----

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Of course, these networks represent the movement of drugs across the globe, and not the consumption or behaviour of consumers in these countries. To that end, figure 10 provides consumption evidence from six exemplary drugs (Amphetamines, Cannabis, Opiates, Opioids, Cocaine, and MDMA) in all forms across the globe. These charts present consumption as circles whose size is a function of the percentage of the national population engaging in the use of that particular drug. From these, broad patterns can also be extracted, and connected to the general flow of drugs discussed previously. For example, amphetamines appear to be most prevalent in Central America, Europe and Southeast Asia. Meanwhile, Cannabis consumption is distributed globally. Opiates are prevalent in Europe, the Middle East and South Asia; while opioids (the synthetic versions) greatly increase their appearance in the United States, who has been combating an opioid crisis. Cocaine is yet another widespread drug, although less frequently taken in Asia, and features more heavily in South

America. MDMA is concentrated in Europe. Altogether, these provide some visibility into the consequences of the connections discussed previously, and the significant global impact of countries like Colombia, Morocco, Spain, and Pakistan in terms of drug trade and consumption.

-----INSERT FIGURE 10 HERE-----

What role can Marketing academics serve in the study of these markets, and what type of recommendations could be expected from scholars interested in the complexities of international systems of exchange as well as global consumption? In the following section, this study turns to previously identified areas of focus for such scholars and aims to connect them to the context of international illicit trade.

### **Implications for International Marketing Research**

In order to focus this discussion, this study relies on the key themes of international marketing research as identified by Leonidou and colleagues (2018, p.17) after reviewing 1722 international marketing articles published in the top six international business journals<sup>3</sup> during the period of 1995–2015. These key themes are: General International Issues (e.g. trade analysis, internationalization); Internal Company Factors (e.g. organizational, managerial); Macro-Environmental Forces (e.g. socio-cultural, economic, legal); Task Environment (e.g. market characteristics, marketing infrastructure); Marketing Research (e.g. methodology, information acquisition); Buyer Behavior; Global Strategy Issues (e.g. market segmentation and targeting); Foreign Market Entry (e.g. importing, exporting); Foreign

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<sup>3</sup> The journals used for their analysis were: *Journal of International Business Studies*, *Journal of World Business*, *Management International Review*, *Journal of International Marketing*, *International Marketing Review*, and *International Business Review*.

Marketing Strategy/Mix (e.g. product policy, distribution channels, pricing); and Specialized Issues (e.g. relationship marketing, digital-global).

From the perspective of this study, each of these ten knowledge areas can be leveraged by experts with the correct “hacker lens” in order to disrupt, or hack, the proliferation of these black markets, and dampen the associated unwholesome demand. The result, as argued previously, is the de-resourcing of Organized Crime, or what we’re viewing as Shadow Multinational Enterprises (SMNE), and the subsequently easier application of law enforcement and criminology activities focused on supply disruption, which are bound to be more effective when confronting a less-resourced opposition. So, how might these themes of international marketing scholarship be leveraged in this way?

### ***General International Issues***

Starting from the broader set of questions, one might start with concepts of trade analysis. In that case, one hopes that the previous exercise around the construction and examination of a robust network of international drug trades stands as evidence of the usefulness of such analyses. By considering trade flows, and the existing body of knowledge, one might be able to identify critical paths for products, financial support, or information. And armed with this knowledge, it should simply follow that specific countermeasures can be developed simply by the inverse application of those factors known to enhance trade.

Similarly, international marketing scholars are often focused on the concept of internationalization itself. Imagine then the process by which a SMNE (e.g. a gang, or cartel) might decide upon its initial or incremental international expansion. What are the determinants and barriers to this process? Which factors might hinder its speed, and which markets might be prioritized? And, within these paradigms, which environmental factors might additionally complicate, slow down, and potentially even stop these processes?

### ***Internal Company Factors***

The understanding of the internal processes of a SMNE might be particularly difficult for scholars to come by outside of historical and forensic studies after their disassembly by law enforcement (ethnographic approaches are certainly strongly discouraged). However, powerful questions remain concerning the role played by resources and capabilities leading to better SMNE performance on the global stage. A core and straightforward assumption above is that the shrinking of resources for any given SMNE will make it more vulnerable. This vulnerability could come from law enforcement opposition, environment, or internal factors. However, which specific resources are most important for a SMNE, which will not have access to traditional institutions, legal systems, and protections? Similarly, which capabilities, if restricted, would result in a decline of the SMNE demand generation process?

### ***Macro-Environmental Forces***

Much of the complexity in international marketing research could be attributed to the diversity and multifaceted interactions between macro-environmental forces. As such, this area is potentially rich with insight for the treatment of markets where SMNEs operate, whether the researcher's focus is socio-cultural, economic, or legal. Consider, for instance, the relative uncertainty of a given foreign market, and the role of regulation or the severity of the law on market risk. How do, or should SMNEs react? Perhaps, from a cultural perspective, the heterogeneity of consumers better explains the consumption behaviors observed in figure 10. Alternatively, maybe it is political instability and opportunism that drives the trade flows observed in our data, or the characteristic import and export destinations. From a technology perspective, how do the expanding digital black markets aid in the expansion of SMNEs? The interaction between the growth in technology, access,

infrastructure development, political and cultural upheavals, and more, certainly is ripe for effects on the demand for illicit products and services.

### ***Task Environment***

This theme is comprised by the concerns around market characteristics (dynamism, uncertainty, turbulence, heterogeneity). It embeds knowledge in specific context, with considerations for the competitive nature of the market. Undoubtedly, this theme would prove rather challenging to study empirically given an expected lack of specific information on the competitive nature of clashing SMNEs. However, the study of the development of illicit marketing infrastructure, such as the availability of distribution channels in any given market could prove to be a significant boom for law enforcement. In fact, the knowledge of development process could lead directly to the stunting to these processes, and the rapid decline of available demand as even existing consumers lose the ability to trade effectively and safely.

### ***Marketing Research***

From a methodological perspective, international scholars have considered the extension of previously developed US-based scales to global measures, but for the study of black markets, researchers might need to further refine them in order to capture the specific socio-cultural information relation to illicit behaviour and consumption. Similarly, other methods of research (such as ethnography) might close themselves entirely to researchers. Even a dark-netnography approach necessitates a significant amount of adaptation in order to protect at-risk populations, but also to safeguard the researcher (both digitally and physically) and associated institutions. Some researcher activities might even be classified as criminal (such as accessing certain hidden systems of exchange around sensitive subjects), even if



done so unintentionally. Yet, access to illicit markets is not particularly difficult (they do want new customers), and neither is the acquisition of the associated data, although it might be classified as risky.

### ***Buyer Behavior***

As captured in figure 10, there is a significant amount of cross-country and cross-cultural heterogeneity in the consumption of illicit goods (e.g. drugs). The cross-cultural comparison of consumer behaviors could illustrate the logic (rational, emotive, or social) behind these differences and the patterns observed across regions and countries. In turn, the behaviors and underlying mechanisms could lead to transferable knowledge and interventions across borders.

### ***Global Strategy Issues***

The full consideration of organized crime as SMNEs and the adaptations and transfer of knowledge from MNE international strategy is equally powerful. Imagine, for instance, the segmentation and targeting process executed by SMNEs as part of their expansions. How do these enterprises handle local partner selection and alliances without traditional institutions safeguarding contracts and norms. What form do these partnerships take? At which point in its growth trajectory do SMNEs decide to expand across a given border, and what does that process look like? Similarly, how do these organizations arrive at their import and export decisions?

### ***Foreign Marketing Strategy/Mix***

The international tactics of SMNEs is another avenue for contribution. Within this theme researchers have considered the role of pricing, product quality, distribution,

promotion, and sales processes. Each of these areas is an obvious area that must be functional in order for an SMNE to succeed, regardless of context or internationalization. How then do the specifics of international behavior affect the most likely practices within the illicit context? With the ultimate goal to “hack” these marketing operations, which are most likely to be effective tools for disruption? Is it possible that there is some predictability in the optimal strategies of SMNEs such that their tactics can be both expected and countered?

### *Specialized Issues*

And lastly, one must consider both the role of relationship marketing for illicit enterprises as well as the impact of the rise of digital technologies in this space, and the role it might play in the B2B component (i.e. the coordination of massive shipments) as well as the B2C component (e.g. the rise and persistence of mega illicit markets in the dark web). Privacy provides an interesting context for exploration in the international and cross-cultural stream, as different cultures certainly do exhibit different preferences for privacy, and technology has enabled uneven and varying levels of protections (e.g. encryption) across countries. As discussed in this study, the existence of dark net markets compliment and augment the physical footprint of illicit trade across borders, and as is the case in traditional markets, the flow of information across national borders is easier than ever.

Altogether, there are a multitude of opportunities for international marketing scholars to apply and adapt their existing knowledge towards the counter-marketing effort of shrinking the unwholesome demand for illicit goods around the world, thus shrinking and de-resourcing SMNEs, and facilitating the work of local and international law enforcement agencies that focus on the disruption of illicit supply. By applying a “market hacker” lens, researchers can adopt this view of systems-of-exchange as their expertise, and confidently

study the complex interaction between the non-traditional nature and context of illicit markets as they interact with the additionally complex set of conditions in international marketing. However, the end result is likely to be a boon for law enforcement, as well as global consumers. The benefit extends to scholars as well, who stand to gain a new environment for the generation and testing of theory, as well as a consolidation of expertise around all aspects of systems of exchange (and not just a focus increasing demand for licit goods).

Considering the wide application and significance of stakeholders, researchers interested in pursuing work in this domain should expect to find collaborators in an equally diverse set of literatures: criminology, economics, sociology, and computer science, among many others. And certainly, the domain expertise from other fields can stand to accelerate our own learning, contribution, and overall impact.

Additionally, a researcher in this domain is encouraged to take keen interest in questions of procedure, safety and ethics when approaching their research design. There are critical considerations in terms of both computer system, researcher, and human participant safety when dealing with risky and illegal consumption, or when entering and studying criminal environments. While there are idiosyncrasies to our research designs, there are valuable frameworks already in place when considering dark web research, such as DICE-E (Benjamin, Valacich, and Chen 2019).

## **General Discussion**

This study had three aims: (1) to illustrate the international nature of trade in the dark web, as well as the similarly international scope of international issues and collaborations it generates; (2) to empirically demonstrate the scale, scope, and structure of the international drug trade; and (3) to motivate international marketing scholars to adapt and contribute their

expertise towards an underexplored market, both as a means to enhance and expand theory, but also to address a market and consumption-related global crisis that is attached to an exceptional amount of human misery, from addiction and exploitation, to poverty, violence, and death.

In this first view of a global illicit market, we see that the social network analysis of such environments does prove to have some significant value. The view of the relational structure between trading countries highlights some obviously known facts, such as the role of Colombia and Afghanistan as large producers and exporters of illicit drugs, but also less obvious ones, such as the roles of Russia and Belgium as connecting corridors facilitating the coordination of the international drug trade. Amazingly, according to the data provided by the United Nations (UNODC), while 187 countries have been observed as participants in this network, 99% of all trade volume is concentrated on just 40 of them and moved over just 5.66% of all available connections. The associated topology additionally points towards an efficient and organized commercial system comprised of three distinct operating segments.

Obviously, drug markets do not comprise the totality of illicit trade globally, serving as just an example in this study. The same could be done separately for each individual drug (allowing for more granularity), or for illegal arms trade, human trafficking, wildlife crime and traffic, digital and computer crimes, and more. Unfortunately, the list is as long as human creativity. Each of these is purely motivated by profit and represent a shadowy perversion of systems that marketing academics passionately study, whether that is from a market, organizational, or individual behaviour perspective. As such, it is presented here as a natural extension of the work currently being done in the literature and represents an opportunity to grow the set of stakeholders whom we help and influence.

Those scholars interested in international marketing might be uniquely positioned to take this step, as the opening quote by C. Katziakas (2018) explains “International marketing

is a rich field in terms of the problems and issues addressed, due in part to the complexity and multiplicity of forces in the international environment and their impact on marketing practices and the development of international firms.” Only a slight addition is needed, recognizing that impact can extend to others impacted by international marketplaces, and some developing international firms (i.e. SMNEs) operate with darker intent.

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**Table 1. Topology of International Illicit Drug Flow Networks**

<b>Measure</b>	<b><i>Unrestricted Network</i></b>	<b><i>Restricted Network (top 5.66%)</i></b>
<b>Global Graph Characteristics</b>		
Number of Nodes	187	187
Number of Edges	1555	88
Number of Connected Components	3	2
Network Diameter	6	3
Average Path Length	2.909	1.50
Graph Density	0.045	0.003
<b>Community Graph Characteristics</b>		
Modularity	0.347	0.369
Number of Communities	8	3
<b>Local Graph Characteristics</b>		
Average Degree Centrality	8.316	3.104
Average Indegree	8.349	2.212
Average Outdegree	8.360	2.666
Average PageRank	0.003	0.005
Average Betweenness Centrality	0.015	0.001
Average Clustering Coefficient	0.322	0.258

**Figure 1. DNM Product Listing for Voter Database (sensitive information removed)**

**Dream Market**

[Shop](#)
Messages: 0

Bitcoin (BTC)  
\$0.00

0

Logout

---

### Browse by category

- » Digital Goods *58948*
- » Data *2542*
  - » Pirated *551*

---


- » Digital Goods *58948*
- » Drugs *75206*
- » Drugs Paraphernalia *326*
- » Services *5764*
- » Other *6820*

---

### Onion mirrors

## Pennsylvania Voter Database 620201 Voters

<b>Vendor</b>	[REDACTED] (240) (4.70★)
<b>Price</b>	\$0.001655 (\$10.3896)
<b>Ships to</b>	Worldwide
<b>Ships from</b>	Worldwide
<b>Escrow</b>	Yes



### Product description

Pennsylvania Voter Database 620201 Voters

All information in this database is in plaintext.

Included information: Voter IDs, Full Names, Physical Addresses, Previous Addresses, Date of Birth, Genders, Phone Numbers, Citizen Status.

We promise:

- Your order will be delivered instantly.
- If you are not satisfied with your order we will refund your order.

### Links

- » Forum
- » Help
- » Conferences
- » Vendor application
- » Earn money

---

### Exchange

BTC	1.0
mBTC	1000.0
BCH	15.2
USD	6276.4
EUR	5523.0
GBP	4854.7
CAD	8312.1
AUD	8974.8
mBCH	15204.0
BRL	24141.0
DKK	41218.1
NOK	52175.7
SEK	57229.3
TRY	37490.1
CNH	44126.0
HKD	50032.8
RUB	421788.1
INR	470659.0
JPY	716554.0

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### News

- » New forum  
*06/02/2018*
- » Downtime & Recovery  
*13/09/2017*
- » Deposit delays  
*27/10/2016*
- » Forum under maintenance  
*12/08/2016*
- » Earn money by finding bugs  
*03/02/2016*

**Figure 2. DNM Product Listing for Speed (sensitive information removed)**

Dream Market

Shop

Messages: 0

Bitcoin (BTC)

฿0.00

Logout

Browse by category

- » Drugs 75324
  - » Stimulants 12223
    - » Cocaine 6704
      - » Meth 1830
        - » Prescription 242
          - » **Speed 2671**
            - » Pills 209
  - » Digital Goods 58951
    - » Drugs 75324
      - » Drugs Paraphernalia 326
        - » Services 5764
          - » Other 6823

2.5 KG Quality speedpasta promotion deal ★

Vendor

(1000) (4.88★)

Price

฿0.38 (€2100.8)

Ships to

Europe, Worldwide

Ships from

germany

Escrow

Yes

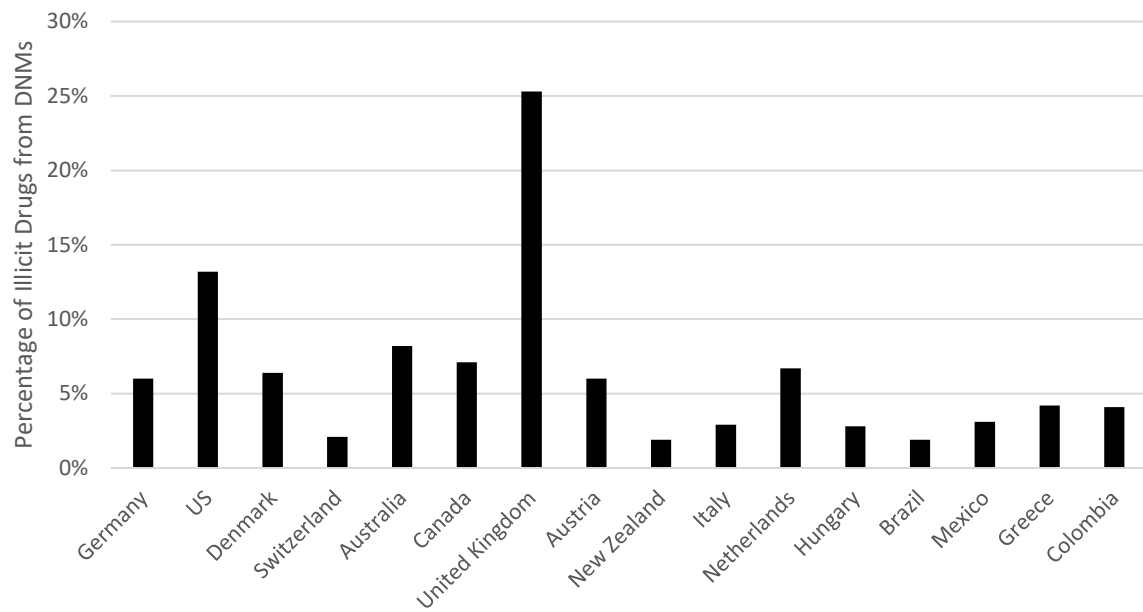
Links

- » Forum
- » Help
- » Conferences
- » Vendor application
- » Earn money

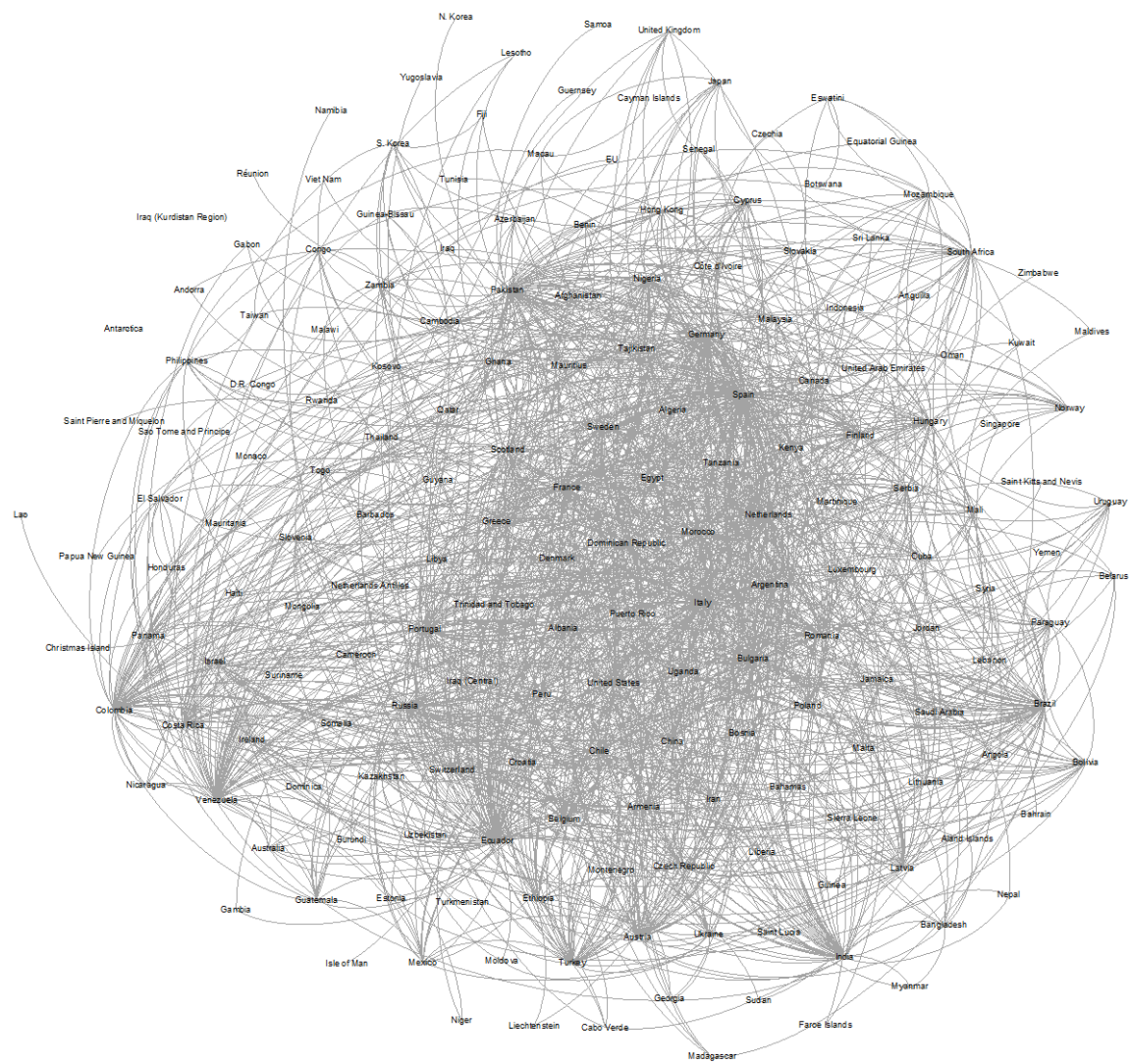
Exchange

BTC	1.0
mBTC	1000.0
BCH	15.2
USD	6276.4
EUR	5523.0
GBP	4854.7
CAD	8312.1
AUD	8974.8
mBCH	15204.0
BRL	24141.0
DKK	41218.1
NOK	52175.7
SEK	57229.3
TRY	37490.1

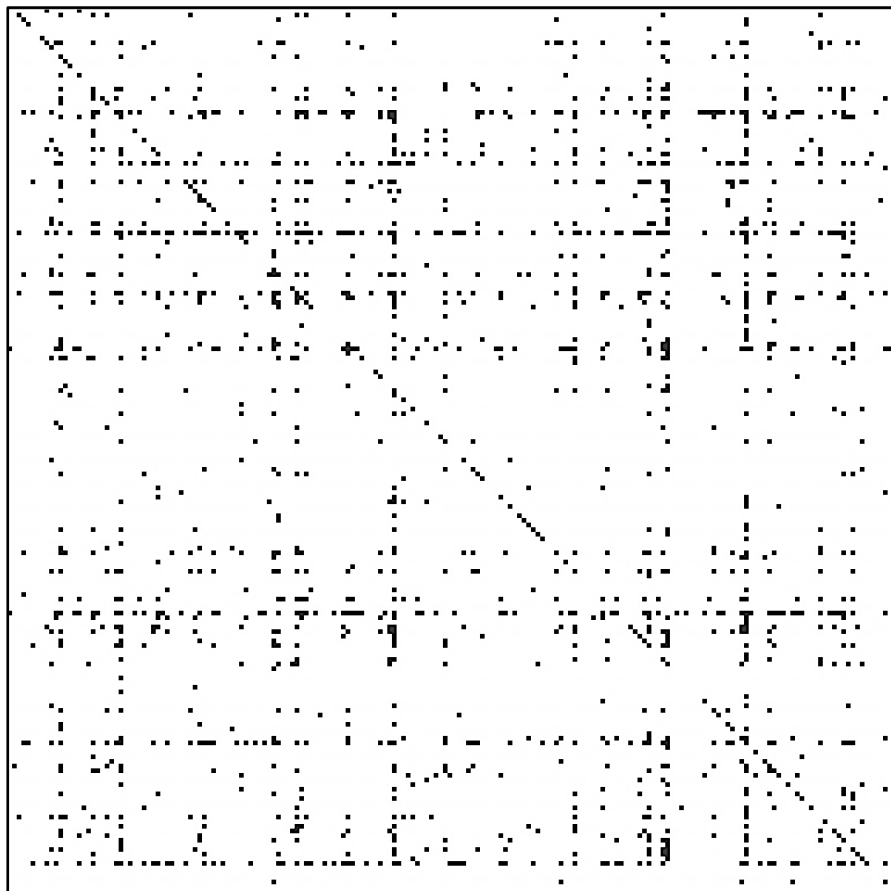
**Figure 3. Percentage of Illicit Drugs Sourced from DNMs (2017, UNODC Global Drug Survey)**



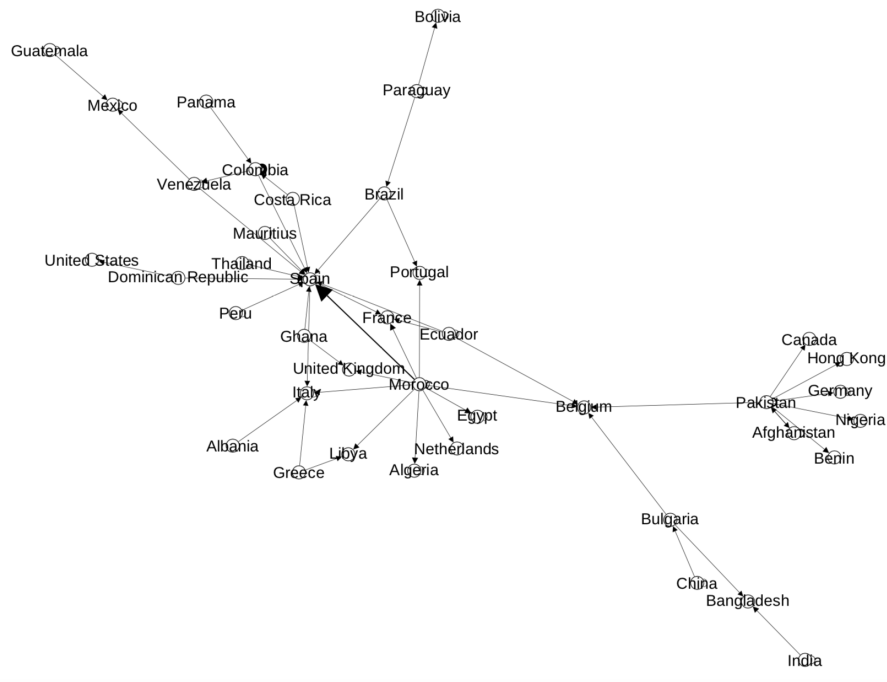
### Figure 4. Unrestricted Network of International Drug Flows



**Figure 5. Pixel Picture of Unrestricted Network of International Drug Flows' Adjacency Matrix**



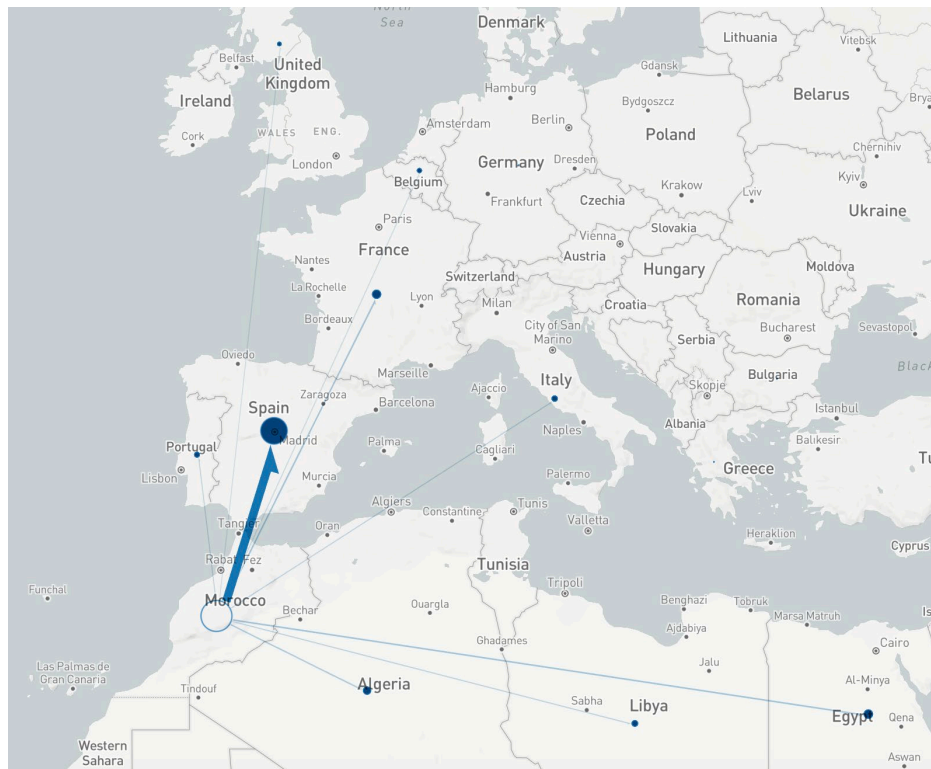
**Figure 6. *Restricted* Network of International Drug Flows, Main Connected Component**



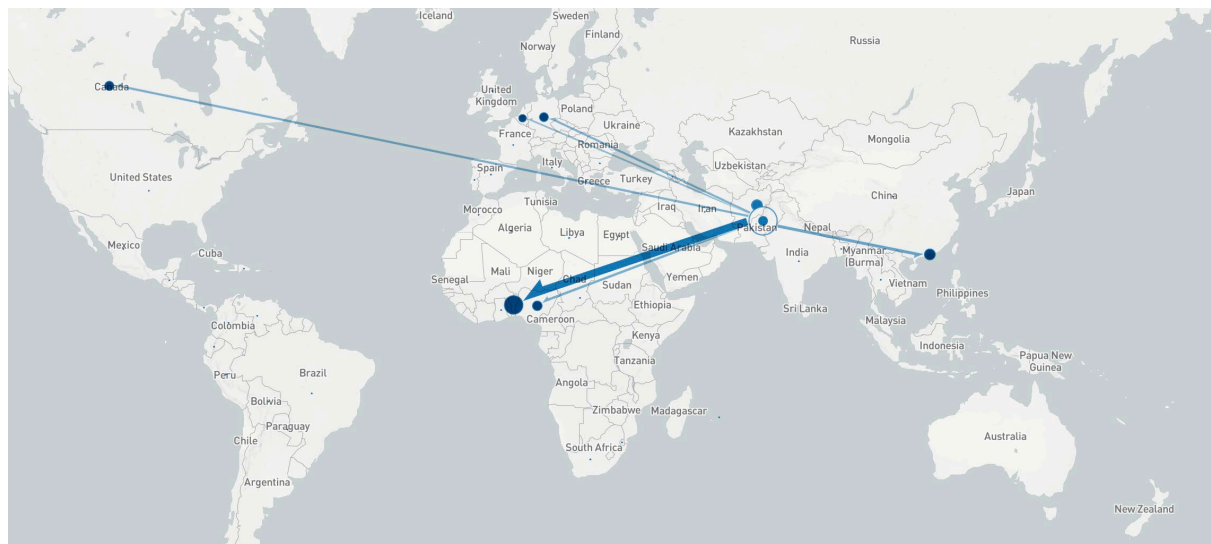
**Figure 7. Global Footprint of Drug Flows (*Restricted*)**



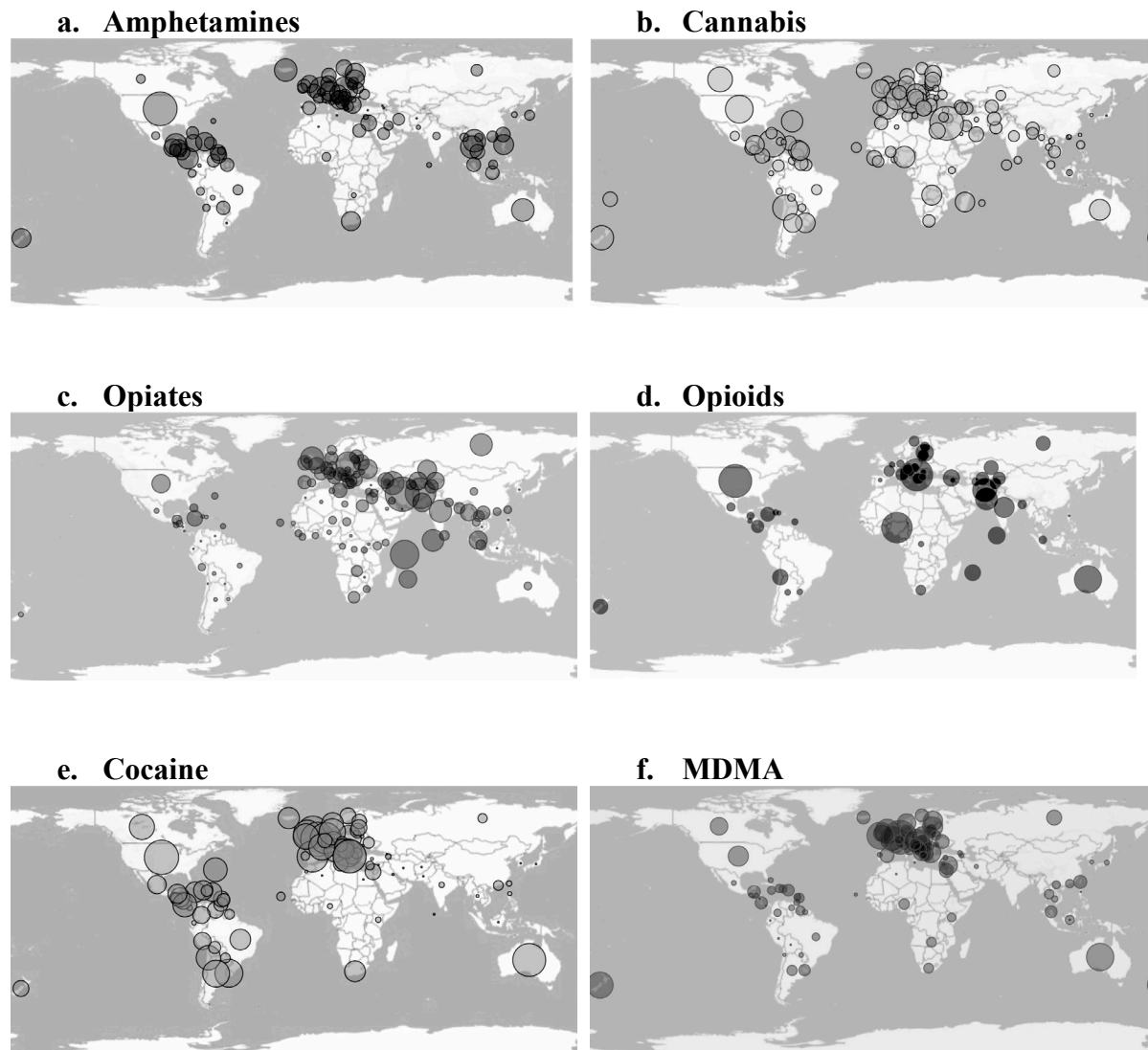
**Figure 8. Morocco's Ego Network (*Restricted*)**



**Figure 9. Pakistan's Ego Network (*Restricted*)**



**Figure 10. Proportion of Populations Engaged in Illicit Drug Consumption**





## Appendix A. Table of Individual Country Characteristics from *Restricted Network*

Country	Indegree	Outdegree	PageRank	Betweenness Centrality	Clustering
Afghanistan	3	7	0.001	0.0008	0.339
Albania	4	11	0.002	0.0001	0.439
Algeria	6	4	0.003	0.0099	0.600
Bangladesh	8	5	0.003	0.0059	0.341
Belgium	29	24	0.007	0.0362	0.259
Benin	5	4	0.002	0.0013	0.528
Bolivia	3	19	0.001	0.0006	0.415
Brazil	12	59	0.004	0.1577	0.147
Bulgaria	45	26	0.022	0.0860	0.227
Canada	13	7	0.006	0.0201	0.305
China	18	19	0.004	0.0227	0.248
Colombia	12	51	0.003	0.0807	0.191
Costa Rica	6	35	0.003	0.0270	0.300
Dominican Republic	2	25	0.001	0.0001	0.342
Ecuador	3	78	0.002	0.1258	0.128
Egypt	14	5	0.006	0.0196	0.310
France	29	35	0.010	0.1241	0.253
Germany	39	44	0.018	0.1658	0.197
Ghana	11	19	0.003	0.0156	0.271
Greece	21	16	0.005	0.0067	0.361
Guatemala	6	12	0.002	0.0012	0.454
Hong Kong	9	9	0.002	0.0033	0.271
India	12	46	0.003	0.0658	0.157
Italy	64	14	0.020	0.0611	0.175
Libya	6	4	0.002	0.0002	0.181
Mauritius	5	2	0.002	0.0004	0.300
Mexico	8	11	0.002	0.0005	0.428
Morocco	15	30	0.005	0.0193	0.243
Netherlands	38	31	0.014	0.0521	0.213
Nigeria	22	29	0.004	0.0685	0.225
Pakistan	8	70	0.002	0.1509	0.112
Panama	3	15	0.001	0.0088	0.310
Paraguay	4	22	0.002	0.0216	0.316
Peru	4	25	0.004	0.0109	0.366
Portugal	42	19	0.021	0.1112	0.227
Spain	76	51	0.034	0.4925	0.116
Thailand	11	11	0.003	0.0075	0.360
United Kingdom	30	15	0.008	0.0598	0.282
United States	25	15	0.008	0.0212	0.271
Venezuela	3	62	0.001	0.0633	0.144

