

Analyzing counter-terrorism and asymmetric conflict policies by means of a system dynamics approach

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ABSTRACT

The aim of our research is to analyze the development of some Islamic terror groups, by means of System Dynamics (SD). SD is a qualitative and quantitative methodology that helps analyzing complex systems, characterized by feedback mechanisms between actions taken by a decision maker and the reactions that the system manifests over time. After building a possible model accounting for the development dynamics common to some Islamic groups of terror, we will firstly analyze traditional counter-terrorism actions and their effectiveness in terms of resolution of threat (we will refer to these traditional counter-terrorism measures like “tactics”). Subsequently, our analysis will focus on a proposal for strategic counter-terrorism actions, in order to show the differences between tactical and strategic actions in terms of resolution of threat. We will also show how strategic measures, through the exchange of data and information between countries, will help in circumscribing and isolating different groups, rather than contrasting them in their direct illegal activities.

ACKNOWLEDGEMENTS:

We’d like to thank Dr. Arije Antinori, for his support in the analysis of the “strategic” level policies as well as for his precious insights in the understanding of potential implications. Also, we’d like to thank Prof. Luigi Geppert, for his precious support in the preliminary steps of our research.

KEYWORDS

Counter-Terrorism, Asymmetric Conflict, Support to Intelligence, Complex Systems Understanding, System Dynamics, Systems Thinking

1. INTRODUCTION

The armed organizations, created by some Western States and Islamic countries since the end of the World War II with the aim of fighting an anti-Soviet proxy war, have developed over time and have started to lay the foundation for an autonomous economy [17]. Such an economy feeds through legal and illegal activities. In addition, it draws its strength from direct and indirect links consolidated with some Islamic economic forces¹, to limit the influence of Western countries and the domain of the Muslim oligarchies their allies.

In this changing scenario, the response of Western countries (reaction) to the growth of Islamic terrorist threat (action), occurred with a delay in the perception of the threat that has fostered the growth of the various terror groups over time. In this sense, we intend to demonstrate that in systemic terms the use of traditional Counter-terrorism tactical policies (“tactics”), based on the contrast of the illegal activities, could not efficiently resolve the threat, allowing different groups to adapt by implementing activities of other illicit nature than those pursued by the authorities.

The use of “strategic” counter-terrorism policies, combined with traditional tactical measures, allows, through the exchange of information between countries (info-sharing), to contain the groups in a specific area in order to control them and to reduce their weapons supply chains in order to reduce their military capabilities .

The purposes of our research thus are:

1. To use the Systems Thinking (ST) and System Dynamics (SD) approach to model and explain a particular historical phenomenon: Islamic terrorism. As a complex and multi-faceted phenomenon, including several sociological factors that contribute to support the involved organizations, the SD approach has been deemed the most appropriate to delve with the understanding of the underlying dynamics.
2. To qualitatively study some traditional (tactical) and strategic (intelligence) counterterrorism policies in order to emphasize their differences and intuitive behavior, as well as advantages when recurring to high-leverage policies, impacting the strategic areas that drive the main dynamics of terror groups.

¹The term refers to some Islamist actors emerged after the two oil shocks and the subsequent recycling of "petrol dollars".

Under the previous perspective, our Research Questions (RQs) presented in the paper are:

1. Is it possible to create a development model that is common to several Islamic terror groups from World War II onwards?
2. How does the proliferation of groups increase the complexity of the system?
3. How can we control or reduce the threat?

2. PREVIOUS STUDIES AND RESEARCH

During our research, a detailed analysis of the literature was conducted, aimed at finding some references (including models) that would respond to the research objectives.

Regarding the System Dynamics approach, we conducted a research of existing models in the "System Dynamics Review"; furthermore, we also selected several empirical works through the website of the System Dynamics Society and in general by means of open search (OSINT - Open source Intelligence analysis) on the web (with the keywords System Dynamics, Terrorism, Counter-Terrorism, and others of the kind). The following results were obtained:.

- "A look at systems thinking Terrorism" (2001) [18] by Barry Richmond, where it is shown that the mental model which has been addressed the war on terrorism by the Bush administration caused a decrease in short-term threat, but in long-term a growth of the same threat thanks to the anger caused by the military methods used by Western powers to combat the threat.
- "Understanding the driving factors of Terrorism" (2002) [19] by Bruce K. Skarin, which examines the threat of terrorist group Al-Qaeda against the United States of America. In particular, Skarin, based on the work of B. Richmond (2001), trying to figure out if the instrument of System Dynamics can help to analyze the complex system of Islamic terrorism. The results are encouraging, which comes in terms of analytical and synthetic understanding of the threat.
- "The Use of System Dynamics Analysis and Modeling Techniques to Explore Policy Levers in the Fight Against Middle Eastern Terrorist Groups" (2005) [4]. The paper analyzes the causal relationship between the policies implemented by the United States in the Middle East and the activities of terrorist groups in the Middle East.
- "Modeling Jihad: A System Dynamics Model of the Salafist Group for Preaching and Combat Financial Subsystem" (2006) by Alex Grynkewich and Chris Reifel [10]. The model describes the behavior of the organization and financing operations of a Salafist group (GSPC).

The three RQs analyzed in the research paper by Alex Grynkewich and Chris Reifel are: 1) how the funding operations affect the amount and type of operations of the GSPC, 2) how the same operations change the "lifecycle" regarding the organization of the group, and 3) what policy-makers should expect in terms of development of the group. The paper has been considered in the analysis of the financing of some Islamic terror groups.

- "A System Dynamics (SD) Approach to Modeling and Understanding Terrorist Networks" by Dr. Stuart Madnick and Dr. Michael Siegel [16]. The paper shows how the instrument of SD can be used to model the issue of terrorism. In this sense, it has been used as a model for the this research model.

The analysis of the above mentioned models supports our thesis that a system dynamics approach can be successfully applied to analyze the complex dynamics of the development of a terroristic threat, thus emphasizing the possibility of a wider development of SD methodologies, due to the (relative) novelty of the application of SD in this field.

Regarding the sociological Islamic terrorism issue, the analysis was carried out at several levels: the theoretical model of the development of terror groups was mainly studied on the works of the economist Loretta Napoleoni (2008) [17], journalist Jason Burke (2004) [6], the historian Walter Laqueur (1978) [13]; (2002) [14]), Arije Antinori (2012) [1]; (2009) [2]

In addition, to explore the theme of the study, we also studied articles and research works for both parties, in particular, carried out by Luigi Geppert (2012) [9], John D. Sterman (2000) [21], Rohan Gunaratna [11], Leweling Tara A. and Otto Sieber (2006) [15], Roger Smith (2002)[20], Torres D.S., De Mena M.P. Lechon F.R. Soto P.F.(2013) [22], Marco Lombardi and his publications at ITSTIME [12], Weber P.C.(2010) [23], Noam Chomsky (2013) [7], , S. Armenia, A. De Angelis (2013) [3], Marco De Marchi, (2009) [8].

3. CONTEXT

After the Second World War, the two former victorious allies had opposites objectives and socio-economic models: on the one hand the United States, thanks to its big economic power, aspired to be the first world powerful country of a "democratic-liberal empire." On the other hand, Soviet communism, to ensure their own safety formed a kind of "satellite states" belt in

Eastern European countries occupied by the Red Army, in which the local communists held the key posts.

It formed what Winston Churchill called the "iron curtain ", a line that divided Europe in two opposite blocks: one Soviet-communist, the other American-Atlantic. The existence of the two opposite blocks, created the need for new strategies such as not to trigger another devastating world war, but able to maintain a state of tension and struggle (including economic struggle) with the aim of wear down the enemy. From that, derived the need to use unconventional or asymmetrical tactics. The war in Vietnam was a first example. During the conflict, the French army and later American realized that it was "impossible to hunt down the guerrillas, who are organized in small units of attackers and saboteurs scattered in the forest and in the mountains of northern of Vietnam, attacking villages and French garrisons with fast and well-planned raids" [17].

The particularities of the local area and the guerilla tactics described above, forced the Western countries to change strategy.

In this new scenario, since 1949 the French army began to use a strategy called "counterinsurgency" which will become the main tactic for military conflicts from the fifties onwards. It provides recruitments, training and funding from the Western powers of men of the war zones. In other words, in order to face a threat in some ways "unsettling" and to avoid a direct conflict, states that emerged winners from the second world war, trained and financed local groups that were tactically mirror to their enemies.

This doctrine is characterized by two interdependent elements: both psychological and economic warfare. The first one aims to sow terror in the enemy and it is a very effective weapon in underdeveloped countries, while the second refers to the systematic sabotage of the local economy. In this sense, they try to "affect the economy by preventing it from supporting the conflict" [17].

An example of " counterinsurgency" is the proxy war who fought for decades U.S. and USSR in El Salvador to contend for power in that area.

The historian Walter Laqueur (2002) [14] argues that the proxy war is "the strategy that supports dissidents, separatists, ambitious politicians, or simply the population unhappy with a rival state." In this sense, "in some cases it was a defensive strategy, which aims to prevent possible attacks by the enemy's potential, other times it was part of an offensive strategy aimed at weakening the enemy and perhaps even prepare the ground for the invasion"

The forms of asymmetric influence, can be of several types:

- financial,

- ideological,
- logistical,
- diplomatic support to opposition movements
- armed support.

The proxy wars have the specific characteristic of carried out in third place, outside national borders, or to be conducted by "client states" on behalf of another State that is not directly involved in acts of war.

A particular case of "State sponsored" is what has been called "anti-Soviet jihad", in which the U.S. trained and financed the Afghan *mujaheddin* with the aim of containing the Soviet invasion of Afghanistan.

United States and Russia were not the only organizations that funded local armed: in fact, the "state-sponsored terrorism" is available to anyone who is able to support it financially. Arab countries, for example, after the first oil shock and the subsequent recycling of so-called "petrodollars", became in excess of liquidity. To invest their huge capital, some Arab leaders including Muammar Gheddafi² financed many armed groups around the world.

In dynamic terms, the development of some of these groups will be a threat to the powerful countries themselves.

The reason for this, is that the different "state sponsored" encouraged the formation of "small terror groups" that over time they began to "go private" through self-financing, to escape the constraints of foreign nations.

According to Napoleoni (2008) [17] in the mid-seventies, the various groups, once internalized the methods used by their sponsors to fund them illegally, they did not hesitate to play the model on their own.

It was created what the author calls "the privatization of terror". And interesting to note is that this process was developed in parallel with the neo-liberal economic reforms of President Reagan and Prime Minister Thatcher. That period, that became famous for the transition to a privatized economy, characterized by the presence of private companies as subjects market regulators.

Some examples of the terrorist groups privatization process were the Arab group called "Popular Front for the Liberation of Palestine (PFLP)", and the Palestinian OLP.

²The Libyan leader came to power in 1969, following a *coup* that led to the fall of the previous ruling monarchy.

The different groups, in addition to becoming independent, they also began to internationalize. In this sense, formed an international network whereby increased their effectiveness through exchange of information, weapons, training and financial collaboration.

4. THE MODEL

The examples mentioned in the previous section highlight the evolution of some terror groups over time; as we have seen, once aware of being manipulated by the state sponsors, groups start to rebel and become economically independent through illegal activities. The armed struggle in the transition from a kind of "state sponsored" to a kind of "private economic infrastructure", it becomes almost a multibillion dollar business and as such more difficult to eradicate.

The immediate consequence is the inevitable proliferation of armed groups, attracted by the possibility of doing business and increase their power.

This, in turn, promotes the development of "a taste for an authentic power" and causes the terror organizations building of an independent state infrastructure. It should be noted that not all organized groups can form an economic infrastructure itself; this depends on how they can reconcile their own internal development with external funding.

The model of the "armed struggle self-funded", unlike the proxy war (first stage of the model), is characterized by the development of an independent strategy, both in terms of popular consensus and economic terms.

In this sense, the new organization of the groups and the changing of global scenario, were probably underestimated by the Western countries, after the victory of the USSR.

In particular, it refers to two specific events: the first one was the Western victory in Afghanistan (1979-1989) and the subsequent financing of the "Islamic struggle" in other countries by the same forces that supported the *mujaheddin* along with the USA, first of all Saudi Arabia.

The second was the disintegration of the Soviet Union and the subsequent Islamic colonization of areas such as Central Asia, the Caucasus and the Balkans.

In systemic terms, the Western democracies did not give enough importance to the dynamic return of the actions undertaken in the past, namely the creation of terror groups.

When the "state sponsor" noticed the change process, they tried to encourage local governments, to preserve the economic interests in those areas. By that time, the process was in place, and the groups fragmentation created by the possibility of self-financing will be an element of complexity that is difficult to remedy even today.

The theoretical parts described above, are the basis on which it will build the simulation model. It has been called "cross" in the belief that the studied variables and the dynamics that are created between the same have weight, at least to a first approximation, for the development of some terror groups since the beginning of the Cold War to the last years.

The Causal Loop Diagram (CLD), that we are about to introduce and explain, represents in dynamical logic the theoretical model of the development of current Islamic terrorist groups, as described above. The complete CLD is reported at the end of the paper, in Appendix (Figure 17). The first feedback of the model represents the concept of "state sponsored"³, thanks to which the various actors began to recruit, train and fund small local terror groups.

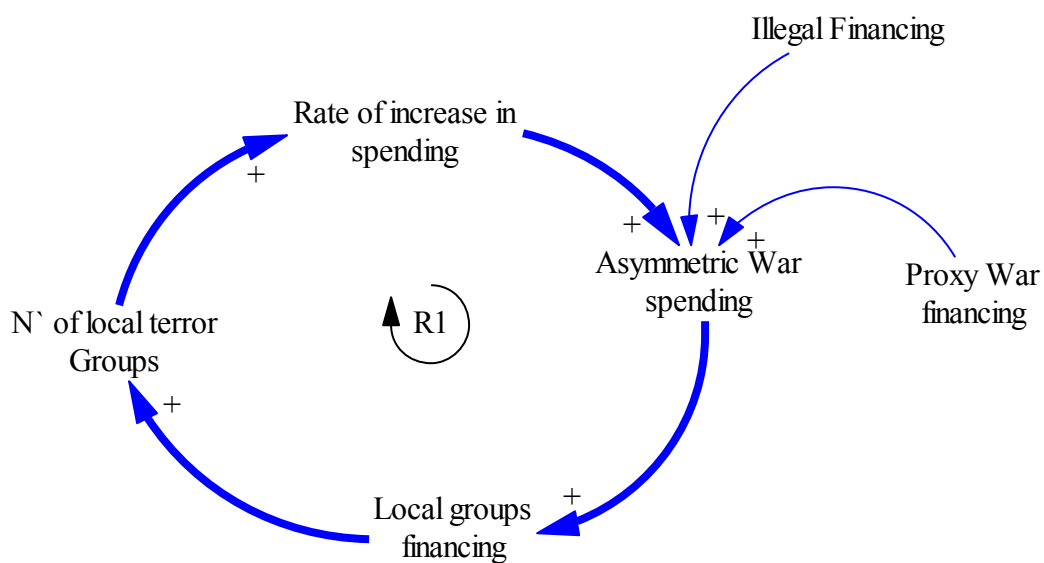


Figure 1: Proxy war, “State sponsored”

Figure 1 shows that the increasing of “*Asymmetric war spending*”, increases resources in favor of the local groups that are financed and this behavior has a positive impact in terms of growth in the “*number⁴ of local terror groups*”. The increase in the number of groups, in turn, requires an increasing of the function of spending (“*Rate of increase in spending*”).

The process described above, can be explained considering an economic phenomenon that to develop, it needs to be fed in a continuously. The overall feedback loop is positive or self-

³The term “State sponsored” does not refer exclusively to one country, but may also indicate a group of individuals or physical/legal entities.

⁴This is a first simplification: in fact, it is not necessarily true that the increase of resources, increases the number of groups.

reinforcing (Loop R1). In this first dynamic development, the expenditure to fund groups is positive and increasing, but will undergo changes over time. In particular, when "sponsors" will recognize (due to a specific path of economic and social development) the increasing of both "Projection capability" and "Military capability" (introduced later in our analysis), they will begin to gradually decrease the resources allocated to groups ("*Proxy war financing*") and instead increase "*Counter terrorism Resources*".

The proliferation in the number of armed groups led to the creation of what Loretta Napoleoni [17] calls "*micro-economies ruled by terror.*" These are mainly funded by economies of illegal activities, including smuggling, kidnapping, hijacking and extortion, by which the armed groups later began to finance themselves, in order to become independent from "sponsors" who had created and funded them in the past. The process of "emancipation" adopted by the groups, as described in detail in the previous section, was neither peaceful (e.g.: methods of terror used by guerrillas) nor indifferent in terms of costs for the countries in which the groups settled. In this regard, it is useful to remember that, to survive, groups draw some of the resources from the countries in which they operate, causing inevitable costs for the countries themselves.

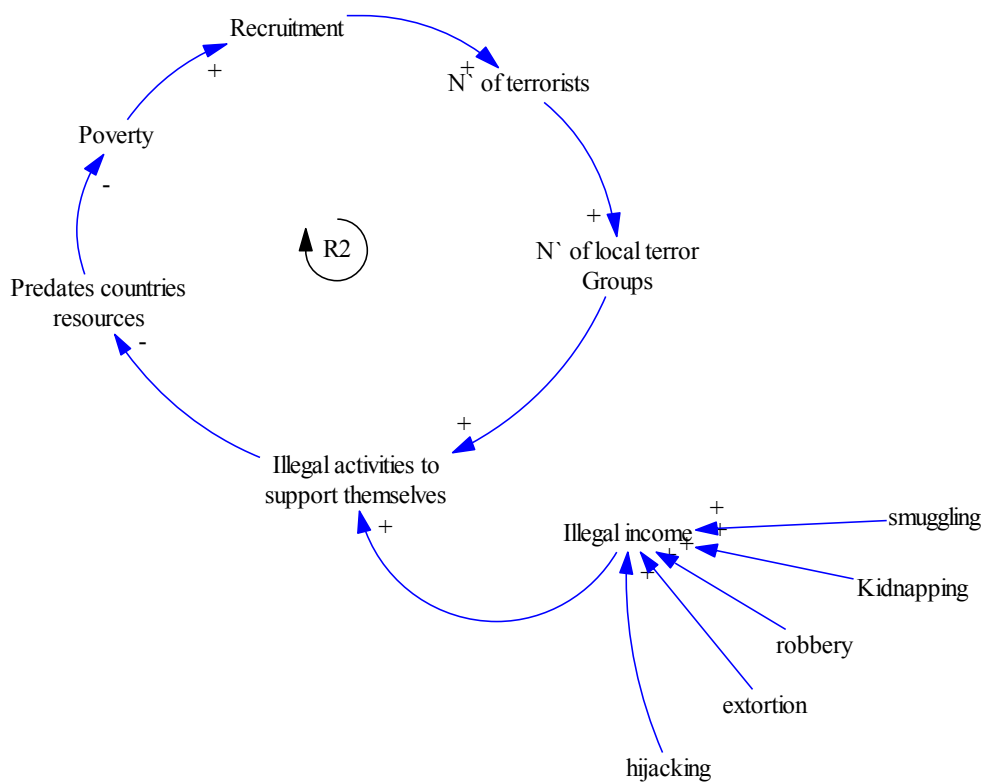


Figure 2: Micro-economies ruled by terror

The second feedback loop, which is also reinforcing (R2), shows that "*illegal activities to support themselves*" are increased by the "*illegal income*" and the "*number of local terror groups*". The increase in illegal activities, as mentioned above, decreases the resources of the countries in which the various groups operate. The process of the resources predation, in turn, increases poverty of predated areas, and the increase in poverty in turn increases recruitment. This relationship comes from reading some research and sociological writings [17] [6] [23] , which emphasize that the increase in poverty in the predated areas is closely related to the increased recruitment carried out by the groups. In this sense, the authors [17] [6] [23] argue that the relationship can be explained, on the one hand by increasing the anger that the "new" poor people feel towards the predators (perhaps fueled by the same group leaders [5]) and on the other hand, thanks to the possibility of survival that the same groups offer to the residents of the predated areas in the form of wages of war [24]. Consequently, the "*recruitment*" process increases the "*number of terrorists*" and, in the medium/long term, also the "*number of local terror groups*". At this point, the increase in the number of groups, requires an increase in the activities to obtain economic support, in a mechanism that reinforces itself over time. After having learnt how to illegally finance themselves, the problem of the different groups became how to launder money and reinvest it in order to build an "*Independent economic infrastructure*" that can guarantee a secure base with which the groups can continue financing themselves. Please note that a likely long-term goal of armed groups is to increase its economic power, in order to increase the political power and replace the existing states, being the latter ones corrupt or not.

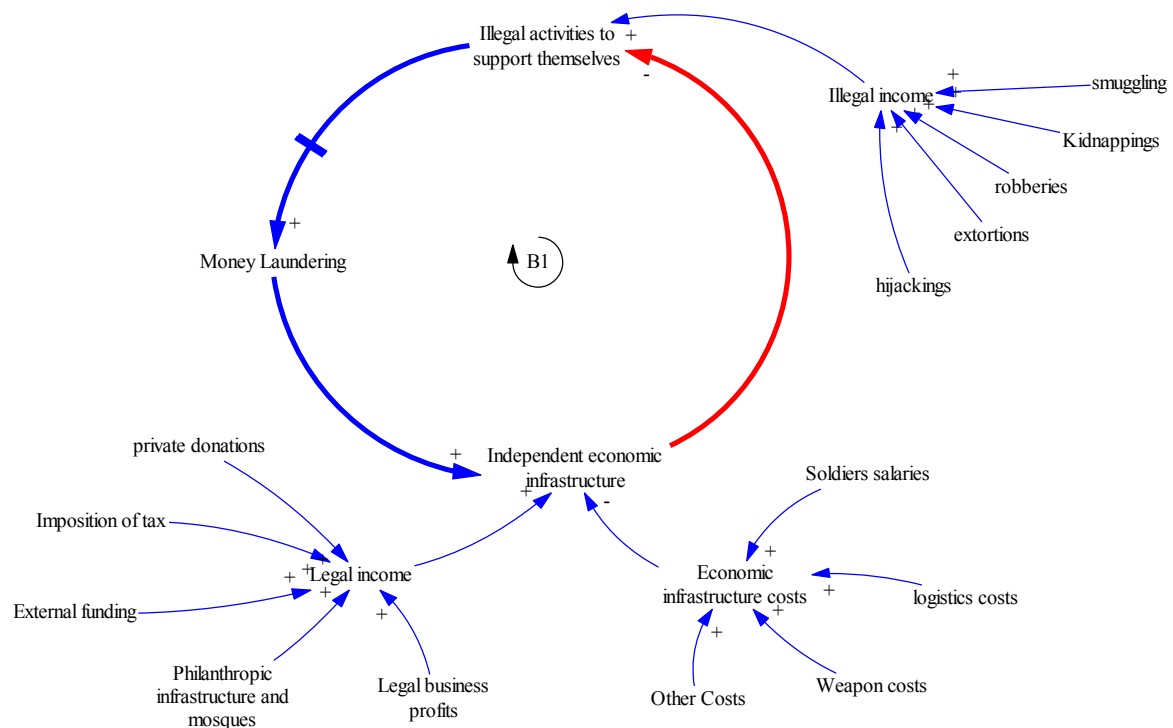


Figure 3: Independent economic infrastructure

The income of illegal activities, by their nature, cannot be used directly to finance cells or increase the economic infrastructure, but must first be laundered. This process takes place with a time delay that depends on several factors such as the time it takes to transfer the money or what actually serves to "clean it up". In this sense, the variable "*Money Laundering*" contains a temporal delay. Once "clean", some of the money increases the economic infrastructure and another part of it is invested, usually in the financial market, to further enhance the infrastructure itself. The increase of "*Independent economic infrastructure*" reduces over time illegal activities, forming a balancing systemic mechanism (Loop B1). This is because the different groups, once formed its own economic infrastructure, have no more interest to put in place any illegal activity, which would increase their exposure to the police authorities. Instead, they began to foster their economic infrastructure through legal revenue and investment. There are some studies that analyze this topic [17][23]: in recent years, for example, the focus on the role of philanthropic institutions has increased. In particular, most of the groups' legal income are derived from private donations, legal business, as was the case of the leader of the terrorist group Al-Qaeda in terms of the profits of Bin Laden family or imposition of taxes where groups settled in the

territories once preyed upon. This last statement refers to the growing political power developed in their respective countries.

Examples of this transition process are Hezbollah in Lebanon and Hamas in Palestine.

“Independent economic infrastructure”, increase in time both “recruitment” and “number of local terror groups”. Regarding “recruitment”, the greater the economic role of the group, the more attractive it becomes by individuals, (e.g. in terms of wages). This positive cause-effect chain forms a reinforcing loop (Loop R3, Figure 4).

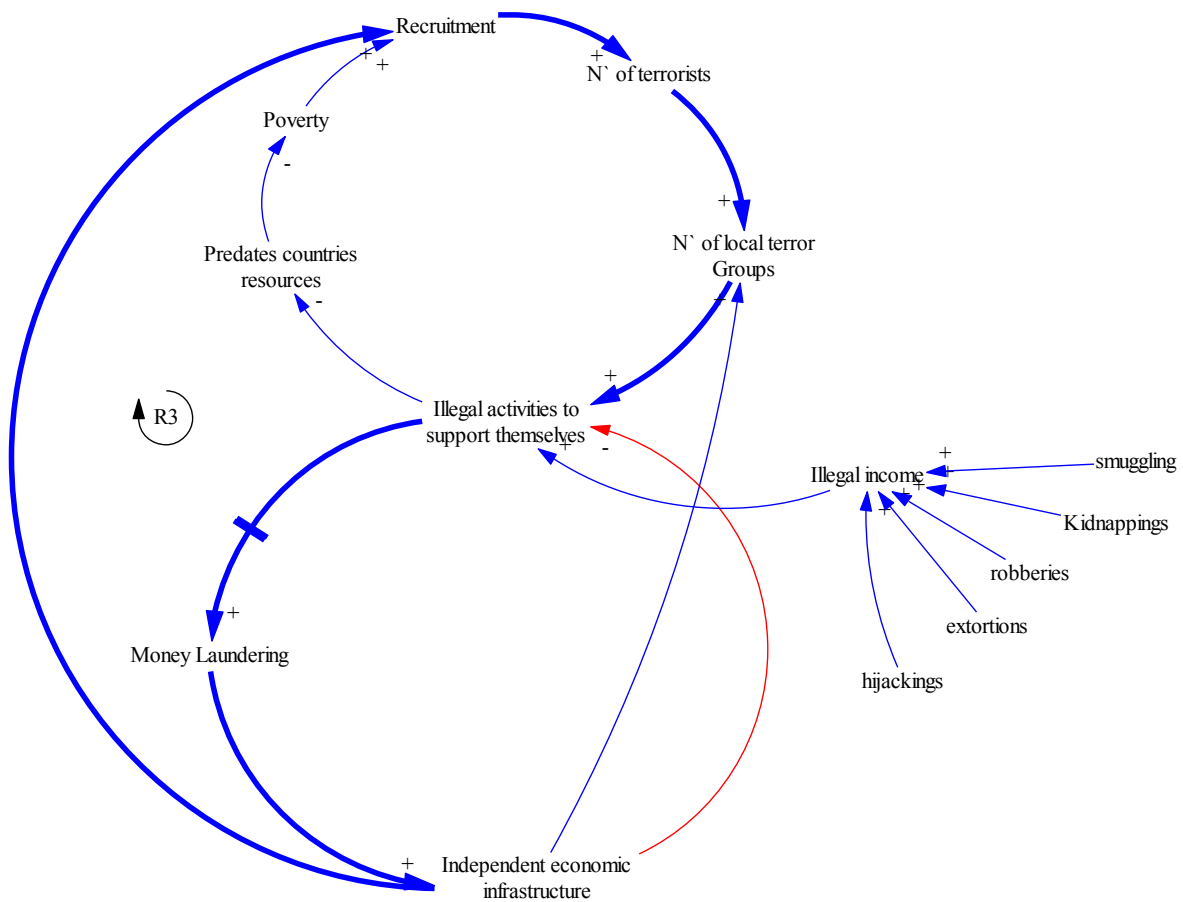


Figure 4: “Independent economic infrastructure” increases “recruitment”

Regarding the increasing of “number of local terror groups”, the greater the economic role of the group, the more groups or cells that can be formed. In this particular example, it is easier

to think about the “*number of local terror groups*” in terms of terror cells or groups. This positive cause-effect relationship forms a reinforcing loop (Loop R4, Figure 5).

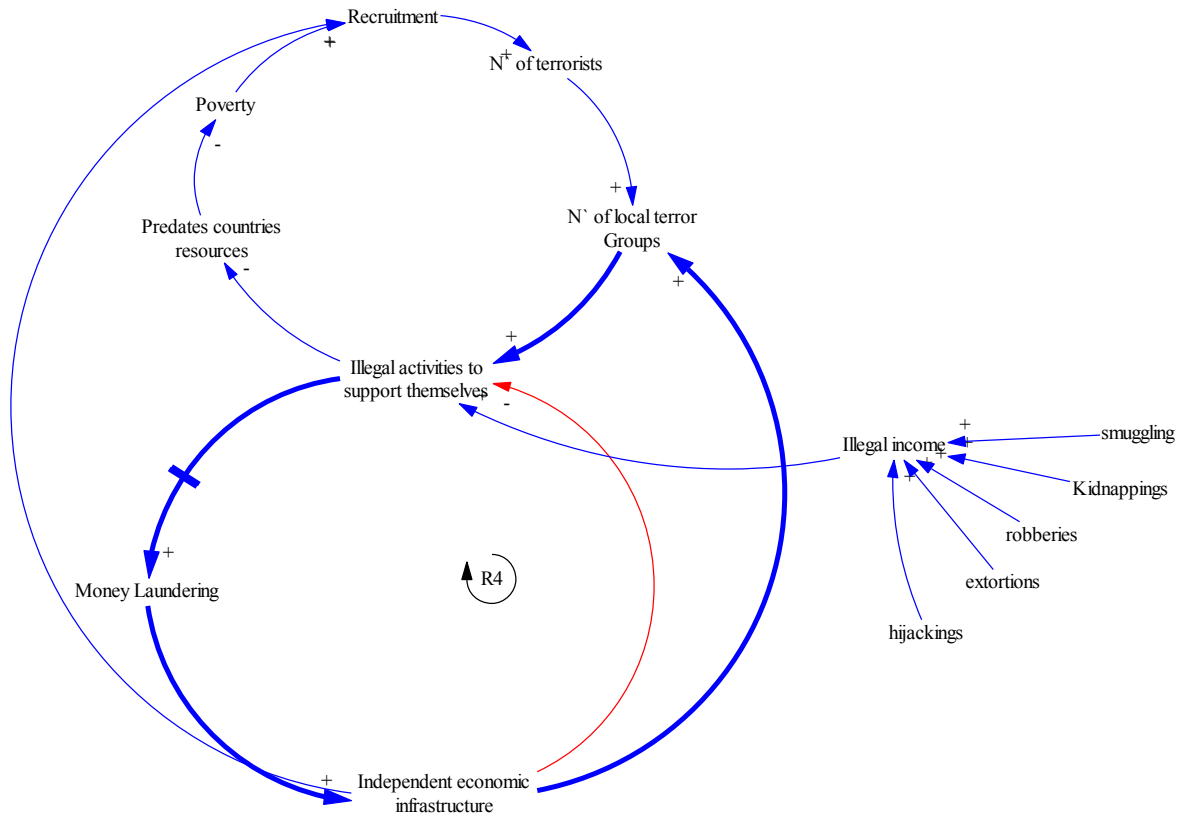


Figure 5: “*Independent economic infrastructure*” increases “*number of local terror groups*”

The expansion of either economic power and “*number of local terror groups*” connected to an original same entity, increases on the one hand the “*Projection capability*” of the groups, in terms of spatial expansion and/or “*frequency of mobilization*” of militants, and on the other hand their “*Military capability*” in terms of implementation of the “*Military training*”, “*weapons supply*” and a possible acquisition of “*unconventional weapons*” [1][2]. This means that they will tend to expand territorially and militarily to enhance their transnational identity and their military power in order to increase their geo-political and geo-strategical power (see Figure 6).

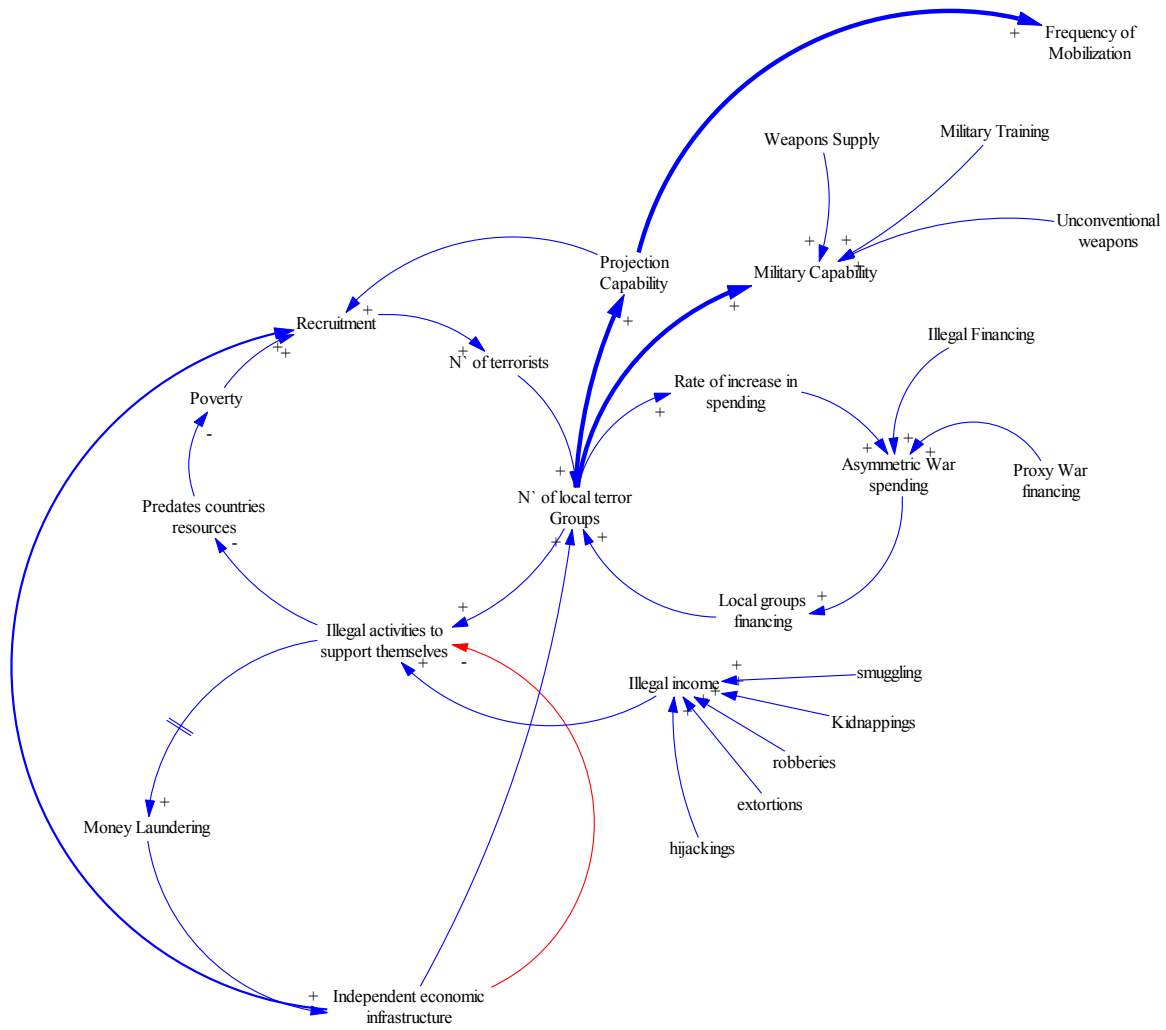


Figure 6: “Projection capability” and “Military capability”

As a direct effect, the "Projection capability," increases the "Recruitment" (see Figure 7, Loop R5) This is because, in general, more a group expands itself for example, in territorial terms, the greater will be the ability to recruit followers.

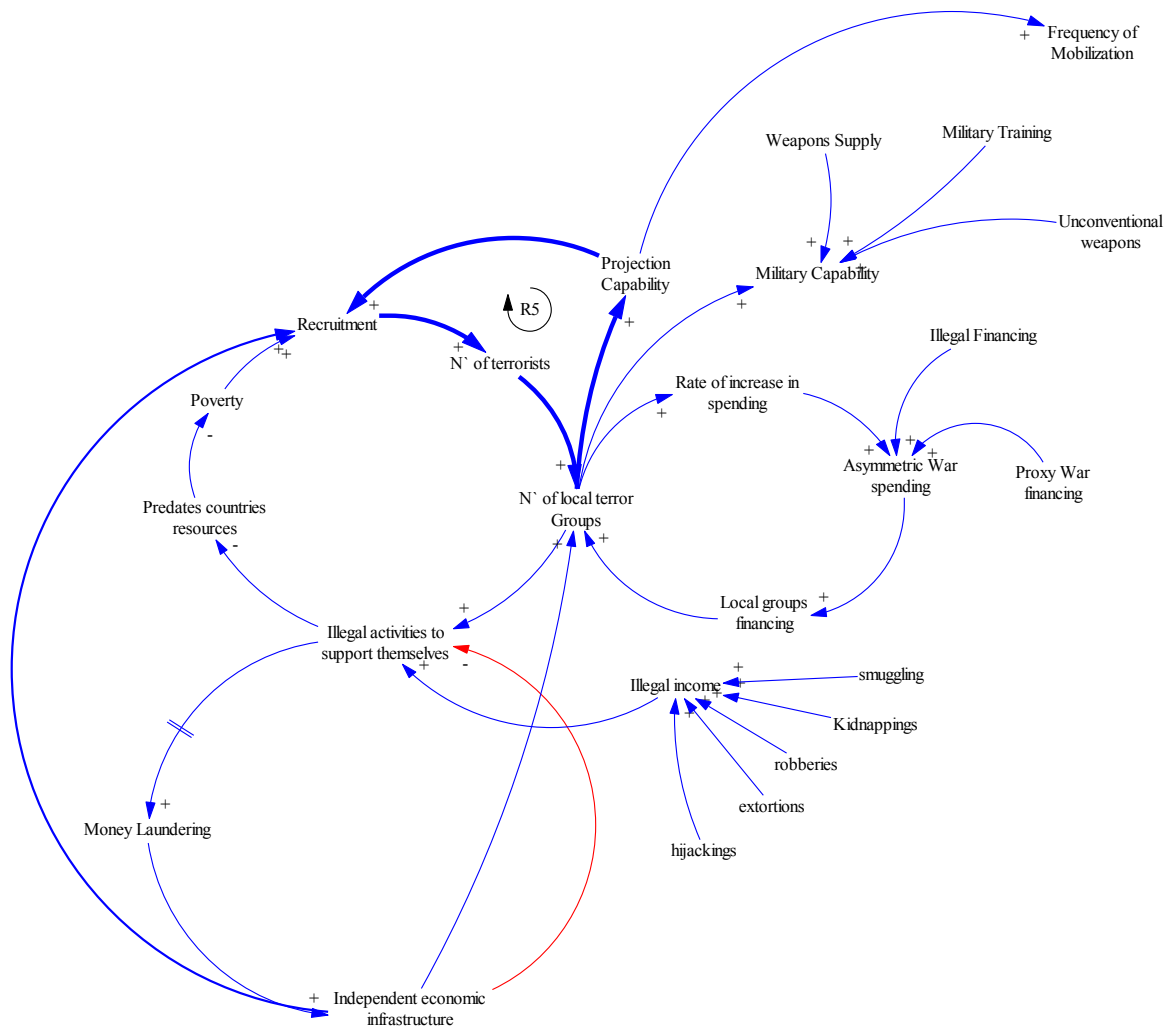


Figure 7: “Projection capability” increases “Recruitment”

Either "Projection capability" and "Military capability" increase the "threat perception" by police and different agencies of information. It should be noted that the process of "threat perception" has a time delay due to the non-immediate perception of danger that could create the groups in terms of military and territorial presence. The "sponsor" State, once aware of the change of scenery and the threat presence, began to decrease funding in favor of the groups "Proxy war financing" and at the same time to increase spending to control its development, given the "Counter-terrorism resources" (Figure 8, Loops B2 and B3).

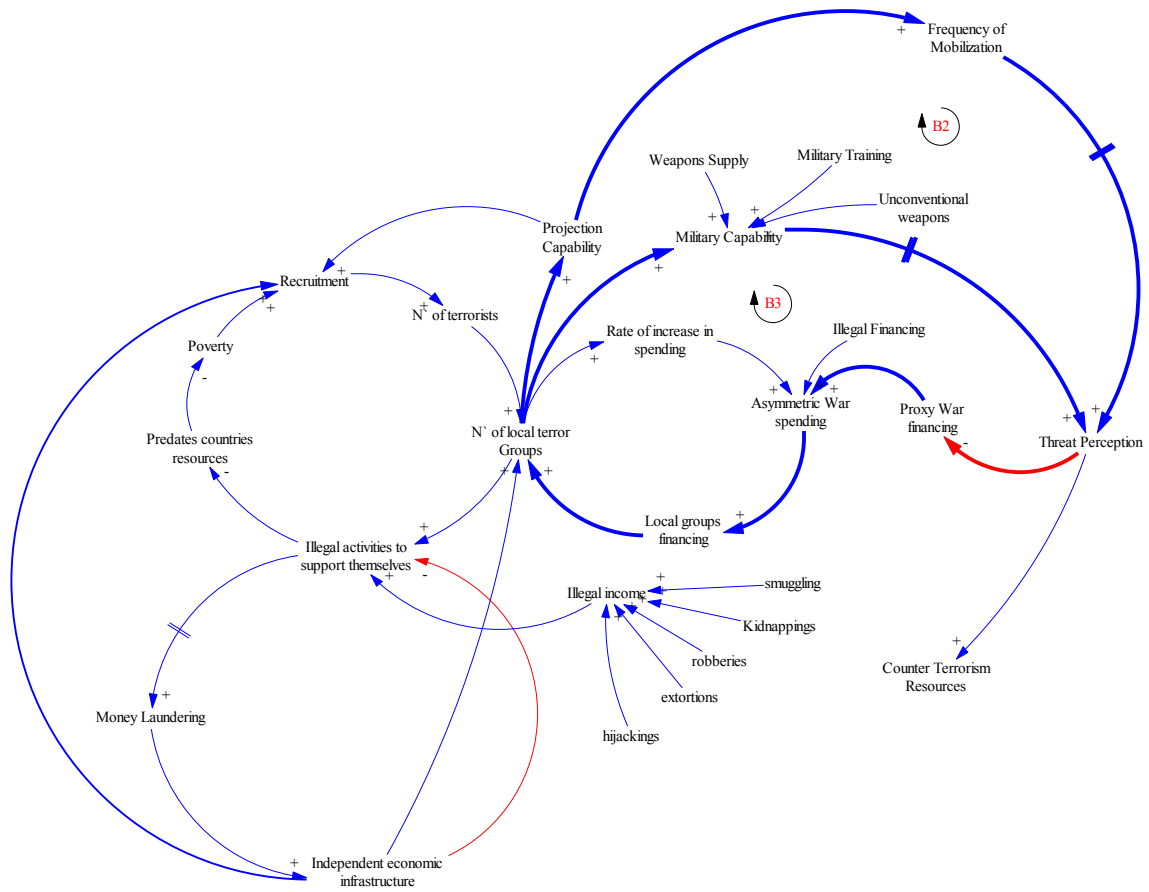


Figure 8: “Threat Perception”

Regarding national contrast, defined as "tactics", “Counter-terrorism resources” focus on the “illegal income” and “Money laundering”. Included in “illegal income”, there are smuggling, hijacking, kidnapping, robberies and extortions (see Figure 9).

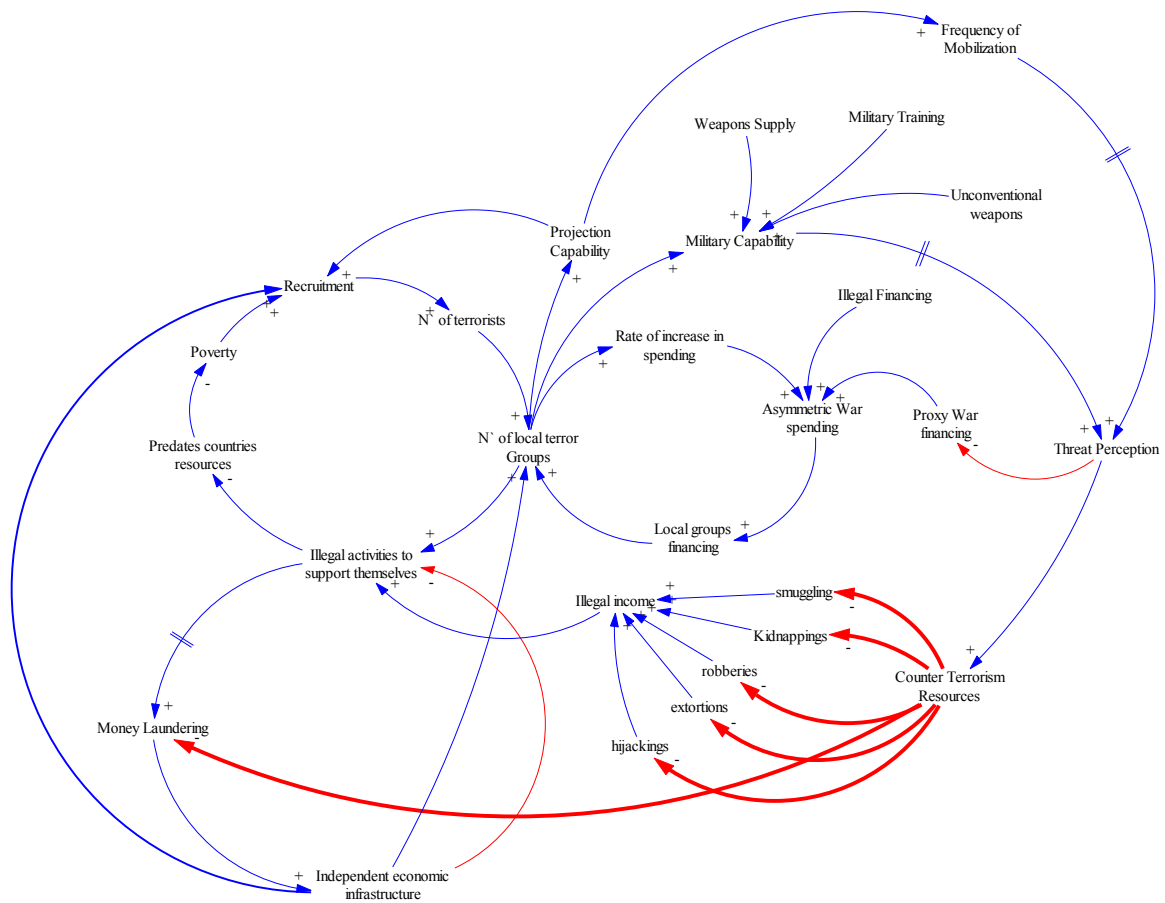


Figure 9: Counter-Terrorism actions, Tactics

Thanks to these "tactics" actions, in the model they create two balancing loops: the first starting from the counter-terrorism actions on "*illegal income*" (see figure 10, Loop B4) and the second starts from the action against "money laundering" (see figure 11, Loop B5)

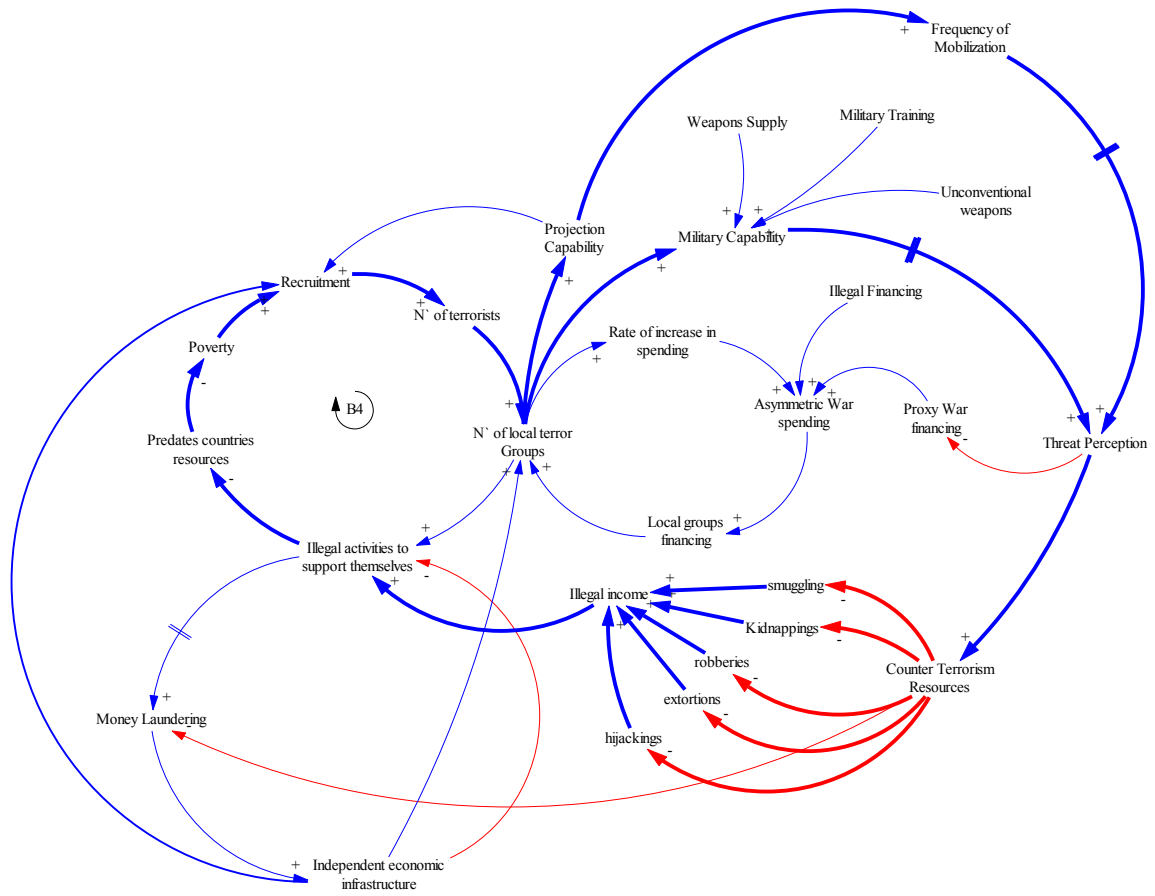


Figure 10: Counter-terrorism actions on "illegal income"

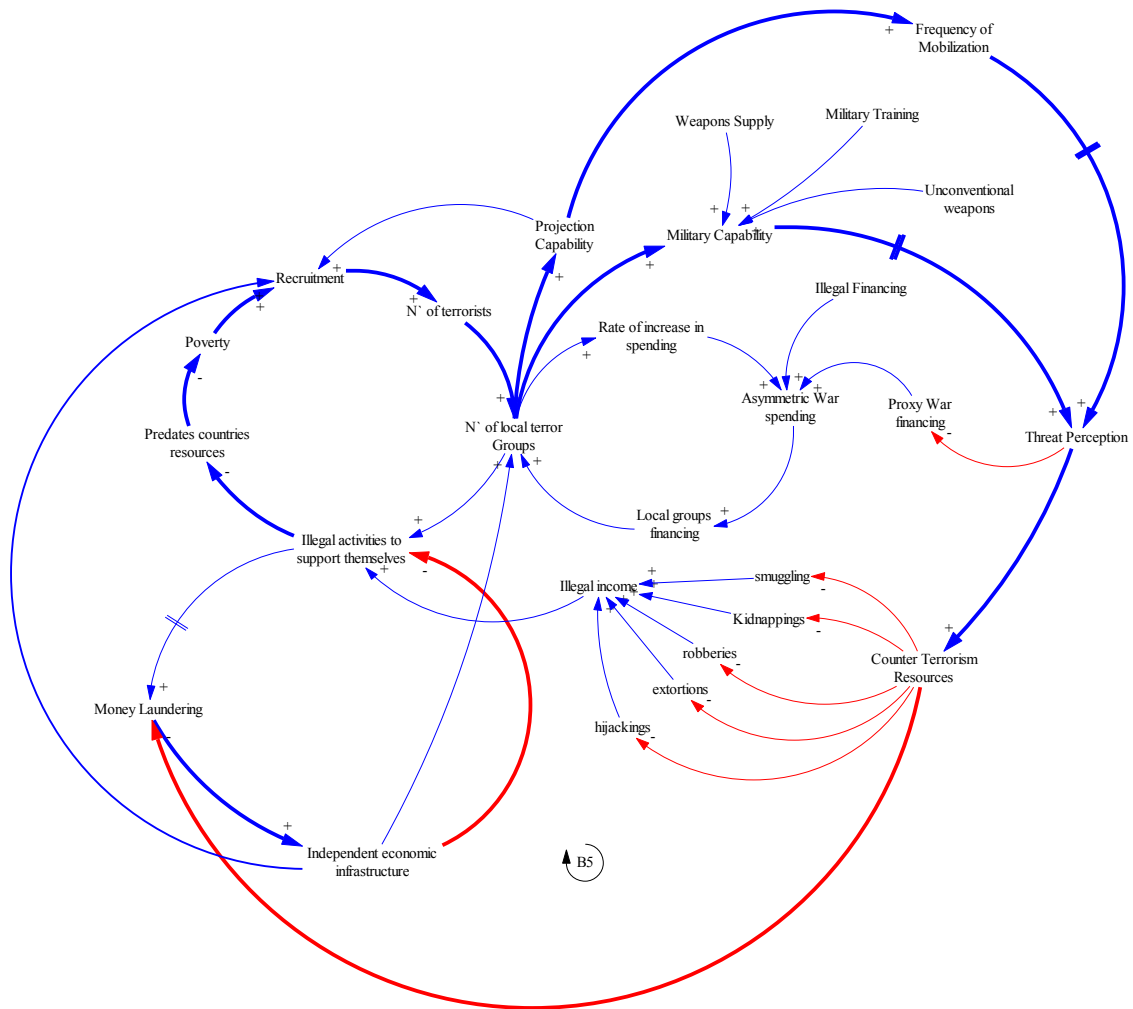


Figure 11: Counter-terrorism actions on "Money Laundering"

After interviewing Dr. Arije Antinori [1][2] on what has emerged from the research, it was suggested to propose, at a strategic level, the introduction of a second counter-terrorism driver through which it might be possible to implement additional counter-terrorism policies. In this sense, in addition to traditional (tactics) counter-terrorism spending, it is necessary on the one hand to operate an activity of border enforcement through the "info sharing" between countries, and on the other hand to focus expenditure on reducing "Projection capability" and "Military capability" of the various terrorist groups.

In this way, it is possible to contain groups in order to control and isolate potential threats.

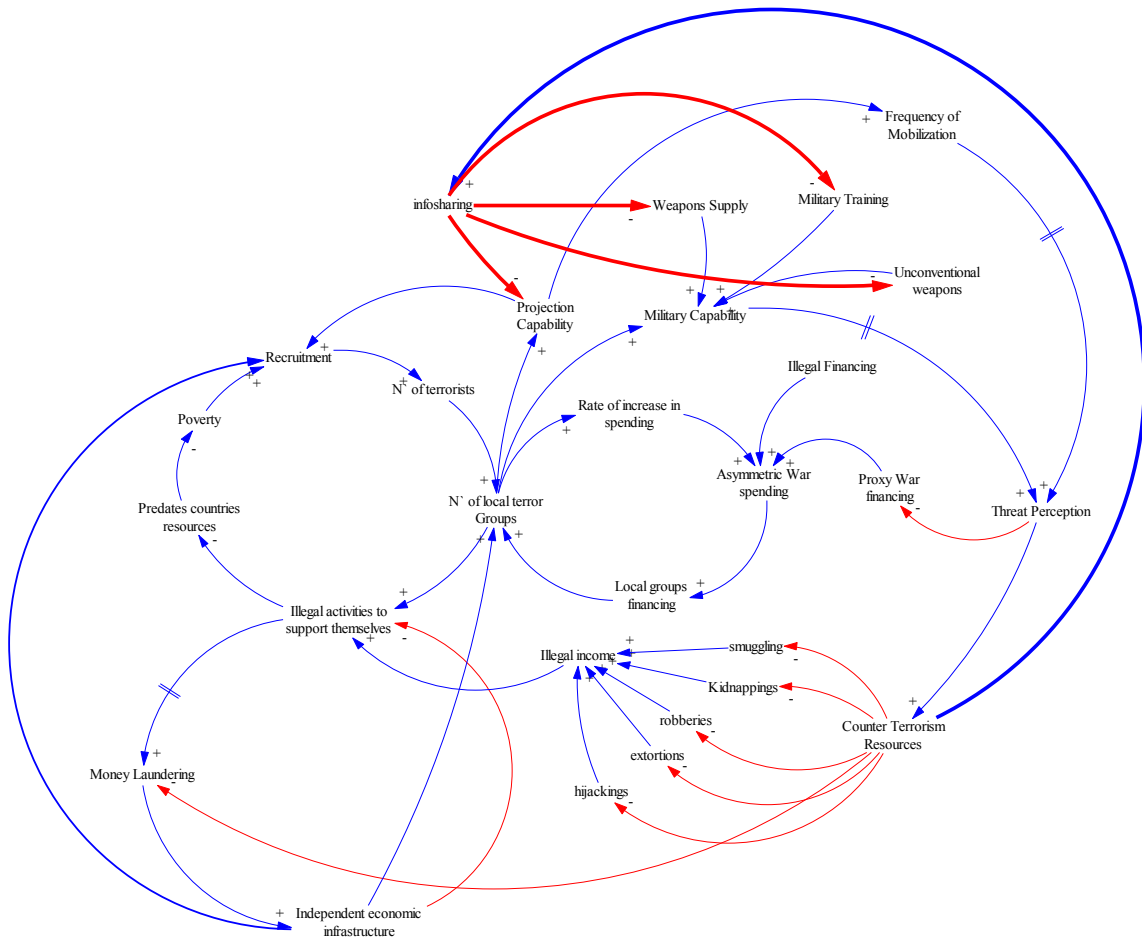


Figure 12: Counter-Terrorism actions, Strategy

In the model, "strategy" actions of counter-terrorism form a balancing feedback (B6) which directly decreases the “*Projection capability*” and “*Military capability*” and indirectly the “*recruitment*” (see Figure 13, Loop B6).

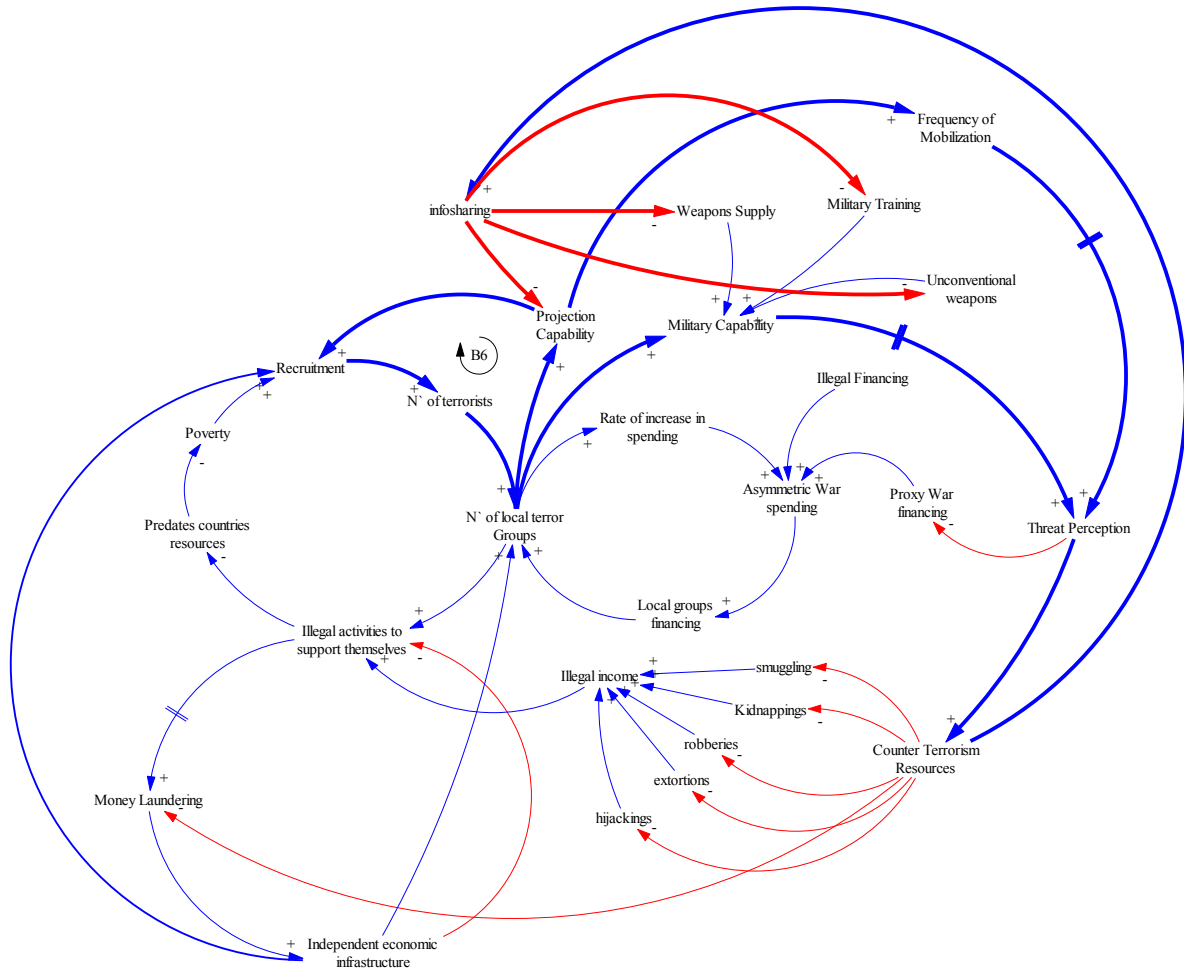


Figure 13: Particular: Counter-Terrorism actions, Strategy, Loop B6

5. CONCLUSIONS AND FUTURE WORK

With this paper we have reported the results of a research that is still ongoing, in particular with reference to the possibility to simulate and try to assess and quantify certain effects. Surely, it provided us with an improved understanding on the model that has been used by several terroristic groups from WWII to just about 2001 (see Figure 14).

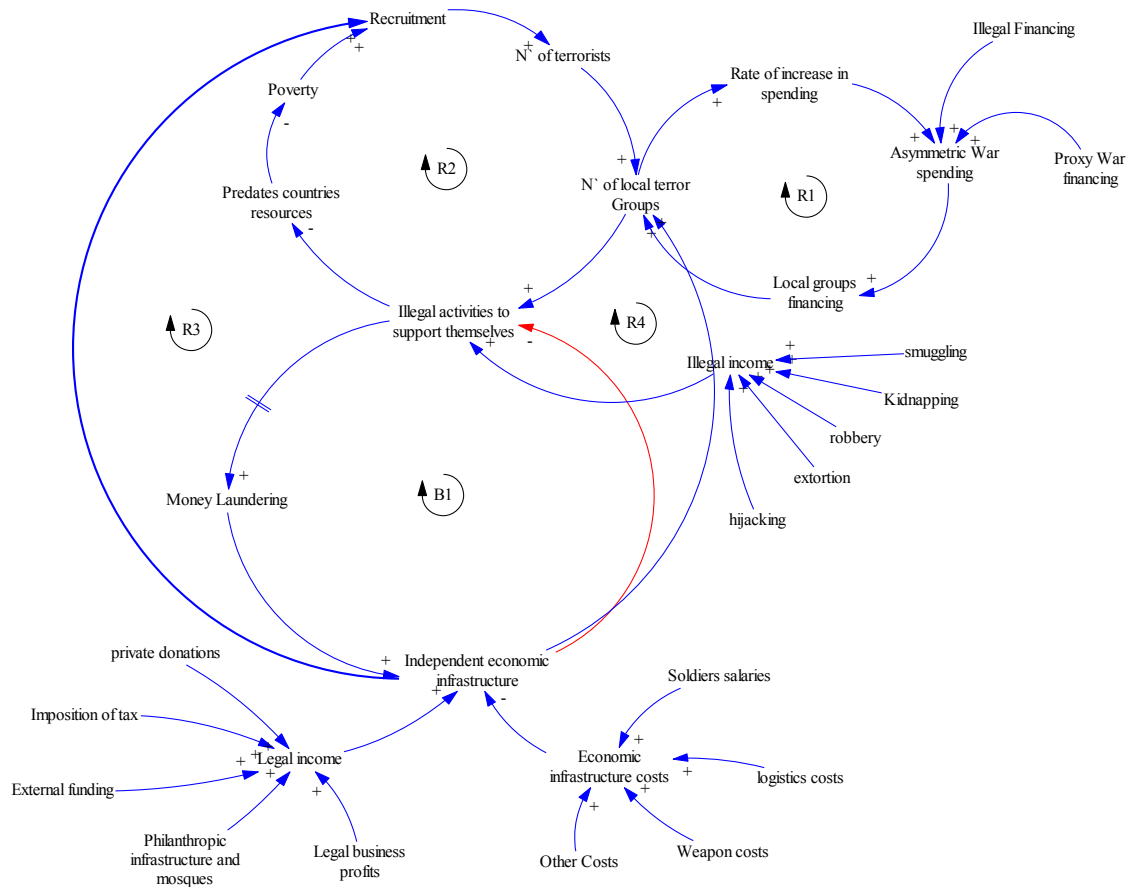


Figure 14: Development of Terroristic Groups base model.-

After building such a model, we have initially showed how traditionally “sponsoring” governments moved from the realization of having created a problem to the attempt of countering it by means of direct policies (i.e.: by hitting the illegal activities through which the new organized groups partially sustain themselves – see Figure 15).

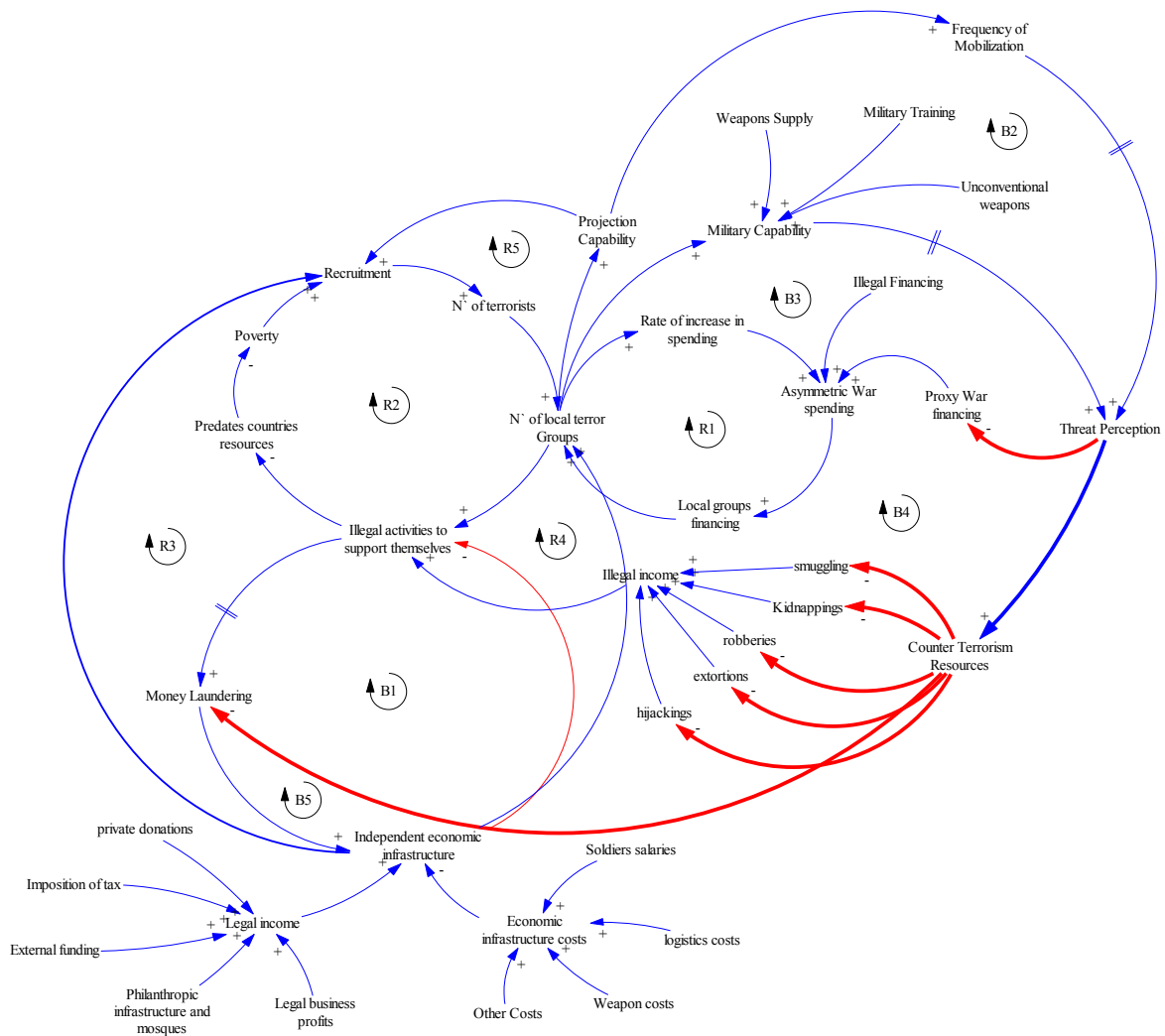


Figure 15: Development of Terroristic Groups base model.-

Though such “direct contrast” policies might have proven effective in a first instance, as these groups have developed a high resiliency (driven by several aspects deeply rooted in their motivations and primary beliefs) and thus tend to change their tactical approaches, these policies prove ineffective in the long run.

Following this, we have argued, by discussing potential implications with an expert of this subject, that strategic level actions might prove much more effective in the contrast of the development and rise of various terror groups. Of course, for their implications, we will not suggest to consider tactical and strategic policies as alternatives, rather to integrate such approaches.

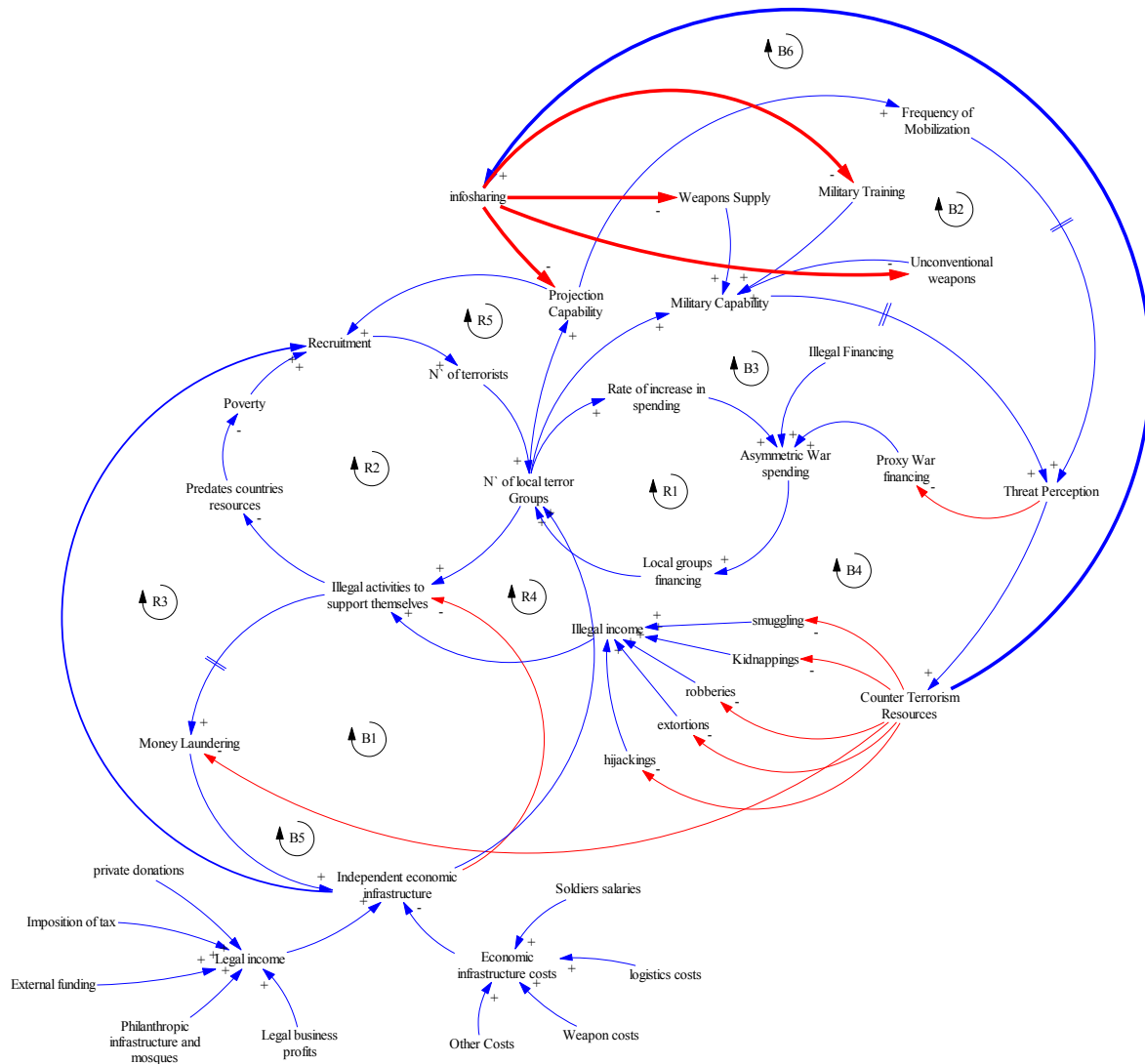


Figure 16: Development of Terroristic Groups base model.-

Our next steps will be to:

1. define the Stocks & Flows Diagram and simulate it in order to be able to assess and evaluate the sensitivity of the model to some parameters and/or some policy inputs (tactical Vs. strategic)
2. assess whether the strategic level policies could be eventually even further improved by acting on the fundamental and “elemental” conditions (Armenia & De Angelis 2013, [3]) that ultimately describe the intimate forces driving the “insurgency”.

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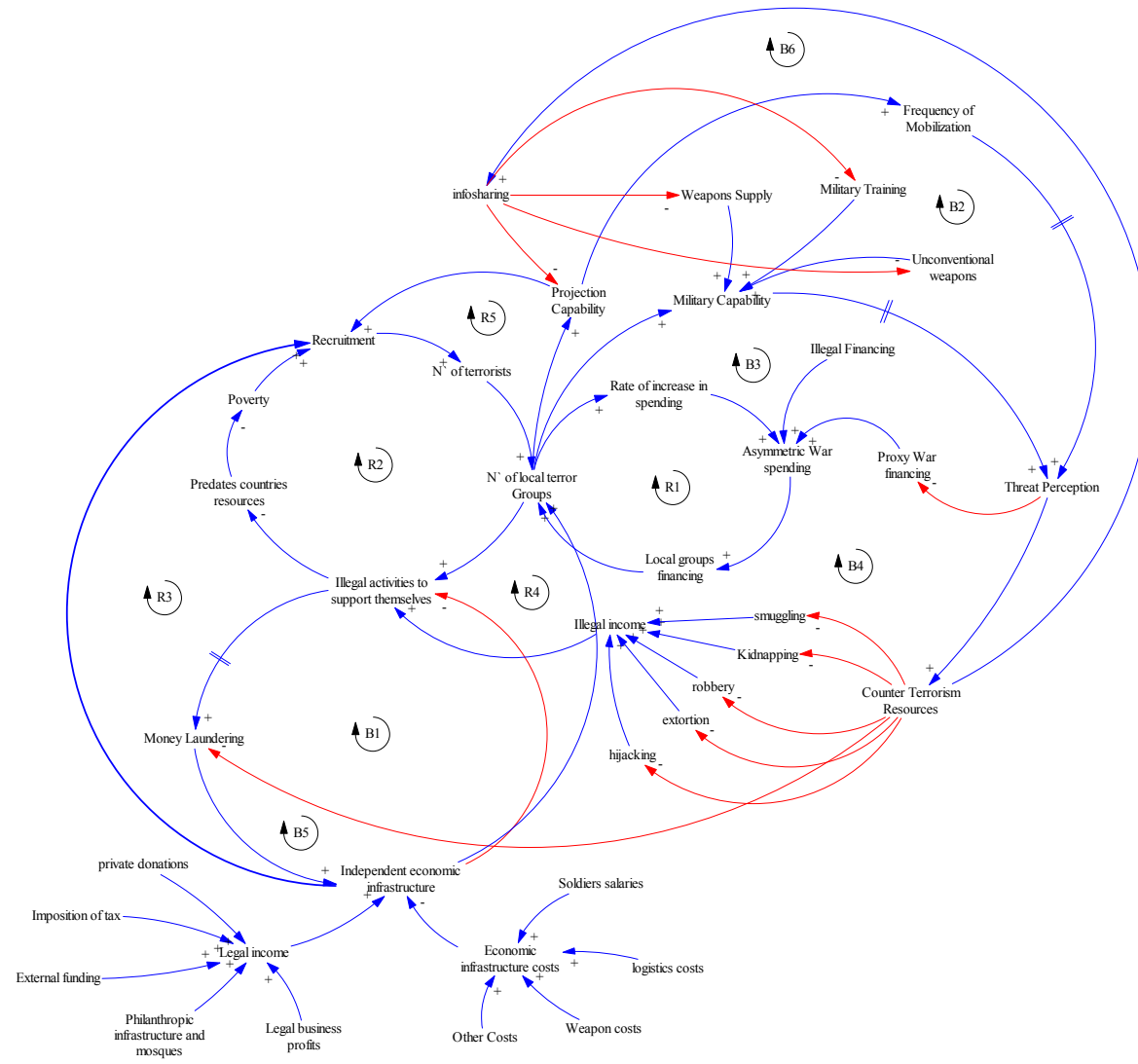


Figure 17: Final CLD