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How Do Terrorist Organizations Innovate?

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by

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Abstract

The present research seeks to answer the question of "How Do Terrorist Organizations Innovate?" An analysis is performed on terrorist organizations by borrowing factors from organizational and innovation theories such as: cost, returns on investment, efficiency, risk and uncertainty, complexity, leadership, environment, goals, and crisis situations. All these factors are affecting how public and private organizations innovate, and through this study one can observe that terrorist organizations' innovation can be affected in the same way. Each of these factors is analyzed for each of the terrorist type of innovation: technological, tactical, strategic and organizational.

Acknowledgements

Chapter 1: Introduction

This question is important because the more innovative a terrorist group the deadlier are its actions. One just needs to observe the threat posed by some of the new tactics and technologies that became part of the terrorist repertoire in the last few decades. For example, suicide bombing became the most lethal tactic and more and more organizations start employing it. Furthermore, WMD's present an even greater threat. Using a Weapon of Mass Destruction cannot be accomplished easily, but Aum Shinrikio with enough financial resources and specialists was able to employ a powerful chemical weapon.

There is scarce research on the topic of terrorist innovation at this point. The more in depth analysis is comprised of: Brian A. Jackson's article "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption" published in 2001, Martha Crenshaw's paper "Innovation: Decision Points in the Trajectory of Terrorism" presented at Harvard University in 2001, Adam Dolnik's work in "Understanding Terrorist Innovation: Technology, Tactics and Global Trends" published in 2007, and Leonard Weinberg's article "Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate" published in 2008. In addition, this paper includes findings from other authors such as Mark Sageman's "Understanding Terror Networks," Robert A. Pape's "Dying to Win: The Strategic Logic of Suicide Terrorism," Gabriel Weimann's "Terror on the Internet: The New Arena, the New Challenges," Graeme C.S. Steven and Rohan Gunaratna's "Counterterrorism," Bruce Hoffman's "Inside Terrorism" and "Terrorist Targeting: Tactics, Trends, and Potentialities."

So far, Brian Jackson and Adam Dolnik have focused on terrorist innovation, but they have not answered this question completely. Jackson, in his article "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption", compares terrorist organizations with commercial organizations that innovate. The latter try to maximize profits, while terrorist groups try to maximize fear and media time to further their goals.[1] Not all terrorist groups are innovative, but the ones that are, tend to be more dangerous. Moreover, Jackson's study emphasizes solely technological innovation and he does not even mention the other types of terrorist innovation such as tactical, strategic, and organizational.

Somewhat similarly, Dolnik's work focuses only on tactical and technological innovations. He leaves out strategic and organizational innovations. Moreover, one cannot distinguish clearly between Dolnik's tactical and technological innovation. Without formulating a definition for these two important concepts, he leaves a blurred line for the reader to make sense out of them. Although Dolnik's study is useful, the research method he is using, the case study is not adequate for the research he conducted. According to Johnson and Reynolds, the case study method is "complementary to…other experimental and nonexperimental designs".[2] So, Dolnik's method cannot be used to create "a comprehensive theory of terrorist innovation" as he promises to do.[3]

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[1] Jackson, Brian A. 2001. Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption. Studies in Conflict & Terrorism, 24. p.186

[2] Johnson, Janet Buttolph and H.T. Reynolds. 2005. Political Science Research Methods. Washington, D.C.:CQ Press. p.88

[3] Dolnik, Adam.2007.Understanding Terrorist Innovation: Technology, tactics and global trends.Abingdon: Routledge. p.2

There are hundreds of terrorist organizations and even if some of them share similarities, many others are quite different from each other.

Thus, by answering the question "How do terrorist organizations innovate?" this study will use Jackson's and Dolnik's studies as a starting point. The answer to this question will be useful because analyzing how terrorist organizations innovative can lead to solutions in stopping them. Moreover, all the previous studies on this topic have used qualitative research methods. While Dolnik is critical of Jackson's economic model, he still incorporates Jackson's factors into his own model. In addition, Martha Crenshaw in her "Innovation: Decision Points in the Trajectory of Terrorism" creates a theoretical framework based mainly on ideas from military strategy, cognitive psychology, and social movements, and proceeds with dividing terrorist innovation into: strategic, tactical, and organizational.

The present study will be based mainly on the organizational theory. Terrorist organizations share some similarities with other organizations too and this approach can be appropriate. Unlike Jackson, who considers only private commercial organizations in building his theoretical framework, the present study includes the public organizations too in the theory. While it is true that commercial organizations are interested in profits, at the same time both public and private organizations want mainly to survive and to gain prestige and power at the same time. According to Thompson, "acquiring prestige is the cheapest way of acquiring power."[4] Besides organizational theory, this study will also use some ideas from innovation theory.

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[4] Thompson, James D. 1967 Organizations in action. Social Science Bases of Administrative Theory. New York:McGraw-Hill Book Company p.33

The question posed in this study is meant to shed some light on the topic of terrorist

innovation on which scholars are quite divided. While some believe terrorists are conservative,

others present evidence that not all terrorist groups are conservative. Among those who support

the idea that terrorists are not innovative are Ariel Merari and Bruce Hoffman. According to

Crenshaw, Merari believes terrorism has not changed too much over the last century when one

compares it with war, and Hoffman too thinks that the terrorists' targets, weapons, and tactics

have "remained remarkably consistent" over the years.[5] However, Merari is mistaken. With a

few exceptions such as the Hiroshima and Nagasaki atomic bombs and the Iraqi army's use of

chemical weapons against its own Kurdish population and against the Iranian army at certain

points in time, war has not changed too much either, explosives and firearms are still the main

weapons to create destruction in wars. Moreover, the military is still organized into various

branches such as navy, air force, and infantry. If one starts analyzing all aspects of terrorist

innovation, it is not hard to notice that terrorist organizations are using new technologies, tactics,

strategies, and structures.

Hoffman too is wrong in his assertion, because terrorist organizations do innovate and they

do it in various ways. According to Hoffman, "bombing continues to account for the majority of

terrorist operations, and most of the bombs are not particularly innovative".[6] Usually, innovation

in most of the fields occurs in an incremental way. Hoffman seems to compare technologies and

tactics at the radical level of innovation. Furthermore, one just needs to observe how terrorists

used different types of bombs. From creating bombs out of dynamite to using plastic bombs or

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[5]Martha Crenshaw, "Innovation: Decision Points in the trajectory of terrorism," (a paper presented at a conference on Trajectories of Terrorist Violence in Europe held at the Center for European Studies, Harvard University, March 9-11, 2001) p.1

[6] Hoffman, Bruce. 1992. Terrorist Targeting: Tactics, Trends, and Potentialities. Santa Monica: RAND, p. 1

liquid bombs is quite a difference. Bombs have become more sophisticated and their lethality has also increased.

Other scholars that seem to be susceptible to terrorist innovation are Graeme Steven and Rohan Gunaratna, who are convinced that terrorists are better improvisers than innovators, but they also admit that the loss of state sponsorships for some organizations was devastating and only through innovation they managed to survive a harsh transition from the Cold War to the period of the last two decades.[7] What Steven and Gunaratna do not realize is that improvisation frequently leads to incremental innovation. Thus, innovation can be the solution for survival in certain cases.

On the other hand, there are scholars who bring forward evidence on how terrorists innovate. Perhaps, the most useful studies on terrorist innovation are Jackson's "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption," Dolnik's "Understanding Terrorist Innovation" and Crenshaw's "Innovation: Decision Points in the Trajectory of Terrorism". The biggest problem with Jackson's approach is that he focuses more on commercial organizations than on terrorist organizations. But Jackson provides a useful list of factors that influence the decision to innovate and to adapt new technologies: "technological awareness," "openness to new ideas," "attitudes toward risk," "nature of the environment," "the nature of technology," "external communication links and the characteristics of technology sources," "the environment of the terrorist group," "characteristics of group leadership and structure," "availability of financial and human

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[7] Steven Graeme C.S. and Rohan Gunaratna.2004. Counterterrorism. Santa Barbara, California: ABC-CLIO, Inc. p. 57, 84-85

resources," "group longevity".[8] While some of Jackson's factors are definitely significant, his study is weakened by the scarcity of examples of terrorist organizations and their technologies that fit his theoretical framework. Also, the first four factors are more important in influencing the decision to innovate, while the rest of them are important in influencing the adoption of technology.

Despite the fact that Jackson identifies these factors mainly by comparing terrorist organizations with commercial organization in achieving political goals and profits respectively, he does not classify terrorist organizations in any way. Which groups tend to be more innovative? Why? Is a certain factor more important than the others? Are there any groups that do not fit into these factors? Also some of the factors can be problematic. For example, with regards to openness to new ideas, Al Qaeda is highly religious and is influenced by the Salafist conservatism, but it is innovative because it uses the Internet for communication, to gain new recruits, to write manuals for followers, it uses videos for propaganda and so on.

Dolnik identifies eleven factors that roughly overlap with Jackson's factors that influence terrorist innovation: "role of ideology and strategy, dynamics of the struggle, countermeasures, targeting logic, attachment to the weaponry/innovation, group dynamics, relationship with other organizations, resources, openness to new ideas, durability, nature of the technology".[9] He uses four terrorist groups: Aum Shinrikyo (Japan), Popular Front for the Liberation of Palestine-General Command (PFLP-GC, Israel), Riyadus-Salikhin Suicide Battalion (Chechnya) and Revolutionary Organization November 17 (Greece) in his case studies comparison. Dolnik finds that the first three terrorist groups are very innovative, because of these main factors: ideology,

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[8] Jackson, Brian A. p.189-202

[9] Dolnik, Adam. p. 13

competition among groups in the same territory, countermeasures and "incidental or unintended acquisition of a particular human or material resource".[10] However, ideology seems not to apply in the case of Al Qaeda due to its conservative ideology, yet it is a very innovative group. This reflects some of the difficulties case studies present. Weinberg draws the attention to the fact that generalizing based on Dolnik's case studies is not such a great idea because his method faces various limitations.[11] Thus, although Dolnik identifies some main factors that influence terrorist innovation, one cannot confirm that they will work for other organizations too.

In addition, Crenshaw divides terrorist innovation in strategic, tactical, and organizational. Strategic innovation implies a new goal and a new way to carry operations to achieve that goal, while tactical innovation involves a change in methods, and organizational innovation requires a change in the group's structure.[12] Crenshaw omits technological innovation, which was the main topic for Dolnik and Jackson. For Dolnik and Jackson, technological innovation is the use of new weapons. The present study will use Dolnik's and Jackson's definition of technological definition and Crenshaw's definition of the other three types of terrorist innovation. Crenshaw's definitions and classification of terrorist innovation are very useful. She reaches the conclusion that terrorist innovation is explained by factors such as political rivalries, problems that need solutions, technological developments, government reactions and leaders.[13] Crenshaw seems to have reached roughly the same conclusion with Dolnik on two of the factors: political rivalries

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[10]Ibid   p. 173-179

[11] Weinberg, Leonard. 2008. Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate. p. 18 Accessed on May 12, 2009 at
http://www.terrorismanalysts.com/pt/index.php?option=com_rokzine&view=article&id=58

[12] Martha Crenshaw. p.2-3

[13] Ibid. p. 10-11

and government reactions which in Dolnik's study are competition among groups and countermeasures. Crenshaw notices that most change that occurs in the terrorism field is incremental[14] and Dolnik too thinks that terrorist innovation is incremental.[15] Thus, although they used different research methods, both authors have reached various similar conclusions. This fact can only strengthen those particular ideas.

In addition to these three main studies, an important article on terrorist innovation is Leonard Weinberg's "Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate". Weinberg not only draws the attention that this topic is under-investigated, but also puts forward valuable observations such as: although terrorists rely often on conventional devices, they start using them "in new and unconventional ways" and he also agrees with Sageman that while in the 1960s and 1970s terrorist organizations had a vertical structure, more recently they seem to be less centralized and organized in cells.[16] Thus, the terrorist organizations do not need necessarily new weapons to be innovative, using a new method can make them just as innovative. Also, by modifying their organizational structure, terrorist organizations are harder to counter. Usually an organization with a strict hierarchical structure can be weakened significantly by arresting or killing the leader, while one that is organized in cells is much harder to put down.

There are other studies on terrorist innovation, but while some narrow their focus on CBRN weapons, others focus on certain segments of technological innovation. For example, David Rapoport in his "Terrorism and Weapons of the Apocalypse" emphasizes the lethality of

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[14] Ibid. p.7

[15] Dolnik, Adam. p. 175

[16] Weinberg, Leonard p. 11,14

an innovative group such as Aum Shinrikyo. Despite the high costs and the level of expertise

needed to build a chemical weapon, the Japanese terrorist group was able to use a gas attack in

the Tokyo subway in 1995, which resulted with the death of 13 persons and the hospitalization of

1,200 people.[17] Thus, although many terrorist organizations are conservative and tend to use the

same strategy, tactic, organization and technology, there are clearly others who innovate. The

lethality of the attack was quite low, but the terror effect and the prestige this organization has

gained after using a weapon of mass destruction, is practically unmatched in the terrorist world.

Ghosh and his contributors in "Science and Technology of Terrorism and

Counterterrorism" speculate on how terrorists could attack with CBRN weapons and what kind

of responses should the attacked countries employ. This book relies heavily on sciences such as

physics and chemistry, and barely focuses on terrorist groups. It gives many details on the

classification of chemical, biological, and nuclear weapons, on their weaponization potential,

delivery systems, lethality and on solutions in case of such an attack.[18] Therefore, the book

shows how some aspects of technological innovation could be adopted by terrorist organizations,

but most of the information presented by these authors are mainly in the realm of "if". The whole

research is based on how a CBRN attack could take place, what kind of agent or weapon would

be used and how should the population take measures to survive such an attack? However, the

technical expertise of these researchers cannot be denied, but their treatment of technology of

terrorism is quite narrow because it is limited to CBRN weapons.

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[17] Rapoport, David C. 1999.Terrorism and Weapons of the Apocalypse. National Security Studies Quarterly. http://www.law.syr.edu/Pdfs/0apocalypse.pdf (accessed February 6, 2009). p. 59

[18] Ghosh, Tushar K., Prelas, Mark A., Viswanath, Dabir S., and Sudarshan K. Loyalka. 2002. Science and Technology of Terrorism and Counterterrorism. Columbia, Missouri: Marcel Dekker, INC. p. 1-553

With a more journalistic approach, King is worried about "dirty bombs"("Radiological Dispersal Devices") which present a huge risk especially due to the fact that they can create mass disruption.[19] Just like Ghosh et al., King's study is very speculative with regards to how could such an attack take place, but he also identifies various sources of radioactive material that can pose a threat if acquired. Identifying sources of radioactive material does not guarantee that such an attack will take place.

Another important aspect of terrorist innovation is the exchange of technologies among groups that share common interests. Cragin et al.'s "Sharing the Dragon's Teeth" provide a number of case studies on Hezbollah, Al-Aqsa Martyrs Brigades, Hamas and Palestinian Islamic Jihad (PIJ) and others. These groups transferred innovative technologies from one to another, "such as IEDs and suicide bombing devices".[20] Their common interest is hatred towards Israel, and they realize that through technology transfer their power increases. Besides dealing with organizations from West Bank, Gaza and Lebanon, these scholars analyzed the exchange of new technologies and knowledge among the Southeast Asian groups such as Jemaah Islamiyah (JI), Moro Islamic Liberation Front, Abu Sayyaf Group, Misuari Breakaway Group and Rajah Soliaman Revolutionary Movement, but also among the Revolutionary Armed Forces of Colombia (FARC) and the Provisional Irish Republican Army (PIRA).

The Southeast Asian groups engaged in these exchanges mainly because they had a similar ideology and while Jemaah Islamiyah benefited in a safe haven, the Philipino groups received in exchange valuable knowledge from the former, and also ideology and especially money

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[19] King, Gilbert. 2004. Dirty Bomb: Weapon of Mass Disruption. New York: Chamberlain Bros. p. 19-20

[20] Cragin, Kim, Chalk, Peter, A. Daly, Sara and Brian A. Jackson. 2007. Sharing the Dragon's Teeth: Terrorist Groups and the Exchange of New Technologies.Santa Monica: RAND. p.67-68

payments have played an important role in Provisional Irish Republican Army's sharing expertise with FARC.[21] The exchanges proved to be beneficial for each of the group taking part of it. Receiving valuable expertise in how to become more lethal made these groups extremely dangerous in the theater of their operations. At the same time, the groups that transferred the knowledge or technologies also benefited by getting something in return. So, the exchange proved to be beneficial for both sides.

Similarly to Cragin, Forest and his contributors in "Teaching Terror" accord a lot of attention to knowledge transfer. According to Forest, "successful terrorist organizations learn from the strategies and tactics of other organizations".[22] If a terrorist group believes that it can be more efficient by employing new tactics and strategies, then it will not hesitate to do so. In addition to knowledge transfer, these scholars focus on the process of terrorist learning and on a few case studies among which one can find Román Ortiz's chapter on how the Revolutionary Armed Forces of Colombia (FARC) innovated throughout the years. Learning is just a step that in some cases can lead to innovation, while in others it will not lead to the same consequences. Some of Forest's conclusions are that knowledge, training, education and adapting to counterterrorist strategies are very important for terrorist organizations and their members.[23] Terrorist organizations that gain valuable knowledge and provide needed training for their own members can be more efficient and have better chances to stay in business. In addition, by adapting to counterterrorist strategies, successful terrorist organizations try to overcome them

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[21] Ibid. p. 44-45, 78, 89

[22] Forest, James JF.2006. Teaching Terror: Strategic and Tactical Learning in the Terrorist World. Maryland: Rowman & Littlefield Publishers, INC. p.262

[23] Ibid. 261-262

while less successful organizations will be easier to defeat. Thus, by focusing on learning and knowledge transfer Forrest et al. provide a useful image of how terrorist organizations can increase their life spans and at the same time remain relevant.

In addition to the literature mentioned above, there are two other studies relevant to the topic of terrorist innovation. Although Pape and Sageman do not focus specifically on this topic, both show how terrorists innovate. Pape, in "Dying to Win" shows how a new tactic, suicide terrorism has become so important in the last few decades. Suicide terrorism rose at an astonishing rate: from approximately three attacks per year in 1980s to about fifty attacks in 2003, and even so suicide terrorism accounted for 3 percent of all terrorist incidents between 1980 and 2003, but it was responsible for 48 percent of the people killed in terrorist attacks.[24] Suicide terrorism spread around the globe and it reached places like Israel, United States, Sri Lanka, India, France, United Kingdom, Iraq, Turkey, Jordan and many other countries. Pape is convinced that suicide terrorism is not characterized by Islamic fundamentalism because he identifies the Liberation Tigers of Tamil Eelam a secular nationalist group, with the most suicide attacks representing 76 out of 316.[25] Various terrorist organizations were willing to employ suicide attacks as a tactic due to its past successes. The most lethal attack was on September 11, 2001 when Al Qaeda members drove two hijacked planes into the World Trade Center Towers, one plane into the Pentagon and one crashed in Pennsylvania which all lead to the death of approximately 3,000 people. Therefore, the lethality of suicide terrorism is quite obvious and

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[24] Pape, Robert A. 2006. Dying to Win: The Strategic Logic of Suicide Terrorism. New York: Random House Trade Paperbacks, p. 6

[25] Ibid. p. 16

whichever terrorist organization starts using it on a regular basis it has a guaranteed high number of casualties among its targets.

While Pape focused on the terrorist tactic of suicide terrorism, Sageman in "Understanding Terror Networks" described how Al Qaeda evolved throughout the years and how from a hierarchical organization it became an organization that is less centralized and better adapted. According to Sageman, Bin Laden allowed "the global Salafi jihad network to evolve spontaneously and naturally…The system developed into a small-world network with robustness and flexibility and became more militant and global for both internal and external reasons".[26] Al Qaeda was an organization that initially had as a purpose to help the Afghan people get rid of the Soviet occupiers, but in time it transformed itself into an organization with an international reach much more spread out. Al Qaeda helped the Taliban in Afghanistan usually through financial and military aid. They provided not only funds for the Taliban, but also training and fighters who came from all over the world to fight the non-Muslim Soviets. For this purpose, a hierarchical structure proved to work quite well, but in the aftermath of defeating the Soviets Al Qaeda started focusing more on terrorist attacks, which were carried out mainly against the West and especially against the United States. The new Al Qaeda structure was less hierarchical and through various networks and cells it was able to carry out incredibly lethal attacks in the name of the global jihad. Thus, Al Qaeda by changing their structure to better fit their new goals innovated organizationally and at the same time was able to survive for such a long time in the world of terrorism. Al Qaeda not only had the capacity to survive for decades, but it also gained so much publicity that very few other organizations can barely match it. Organizations that can

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[26] Sageman, Marc. 2004. Understanding Terror Networks. Philadelphia: University of Pennsylvania Press. p. 172

adapt to the environment have better chances to still stay in business than those who cannot adapt.

Also a more recent article in Newsweek "The Taliban: In Their Own Words" describes how the Taliban reorganize themselves and how through cooperation with "the Arabs" they became much stronger. The authors of this article Sami Yousafzai and Ron Moreau, do not even mention the word Al Qaeda. However, one can deduce for himself/herself by noticing the tactics, strategies, technologies and theater of operations that everything happens in Al Qaeda stronghold areas. One Taliban leader, Younas mentions "the Arabs…encouraged the Afghans and the local tribal people not to give up" and another one, Haqqani admits the importance of receiving "new weapons and techniques: bigger and better IEDs for roadside bombings, and suicide attacks".[27] Simmilarly to Cragin et al., Yousafzai and Moreau emphasize the importance of technology and tactics transfer among terrorist organizations. However, the latter rely primarily on interviews with Taliban leaders. Al Qaeda received a relatively safe haven from the Taliban, while the Taliban in exchange were receiving training, new technologies, and valuable advice on how to reorganize. For Al Qaeda, helping the Taliban is helping itself as an organization in a fight for survival. After the collapse of the Taliban regime, most of Al Qaeda members chose to relocate across the border into Pakistan. Now, that pressure is felt from both the US and its allies in Afghanistan, and the Pakistani army in Pakistan, Al Qaeda realizes that its chance to survive lies with its good relations with the Taliban who are quite a force in terms of numbers at least. In case the Taliban will be weakened significantly, Al Qaeda's other chance for survival is relocating again to a safe haven. Potential safe havens for it can be Somalia or Yemen. As a

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[27] Yousafzai, Sami and Ron Moreau. "The Taliban: In Their Own Words," Newsweek, October 5, 2009. p. 37-40

highly innovative organization, Al Qaeda can choose again to change structure or to reorganize in a way that will better fit the environment it inhabits.

Thus far, with the exception of Jackson, Dolnik, Crenshaw and Weinberg, the other scholars do not focus specifically on terrorist innovation. Jackson focuses mainly on technological innovation, Donik on technological and tactical, Crenshaw on tactical, strategic and organizational, and Weinberg reviews Dolnik's and Crenshaw's work on this topic. The other scholars have narrowed their focus to certain aspects of innovation or to certain technologies or tactics. For example, Rapoport, Ghosh et al. and King are researching CBRN threats. Cragin et al. and Forest focus mainly on knowledge and technologies transfer, and to a less degree so do Yousafzai and Moreau. In addition, scholars such as Pape and Sageman show how terrorist organizations adopt a new and deadlier tactic, suicide terrorism and how they innovate organizationally, by creating a new structure respectively. So, it is quite obvious that the topic of terrorist innovation has not been researched enough. The existent literature seems to prefer researching mainly technological innovation or a certain aspect of it, and barely mentioning the other types of innovation.

Based on Weinberg's suggestions in his "Two Neglected Areas in Terrorism Research: Careers after Terrorism and How Terrorists Innovate," the present research will identify and classify which groups are innovative strategically, tactically, technologically and organizationally[28], but also how terrorist organizations innovate. There are several terms that require definition before proceeding with the research. Among those terms are: terrorism, innovation, terrorist innovation, incremental innovation, radical innovation. The definition of terrorism used here is "the deliberate creation and exploitation of fear through violence or the

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[28] Weinberg, Leonard. p. 18

threat of violence in the pursuit of political change".[29] Terrorist organizations are using violence and the threat of violence usually to influence the public opinion and various governments. They live on publicity. Their targets are quite numerous and from various fields. They can be airports, airlines, government buildings, businesses, tourists and many others.

Not only that there are many definitions for innovation, but others also distinguish among the degrees of innovation. Three degrees of innovation have been identified by scholars researching this topic in multiple fields of study: "products new to the firm only, products new to the industry, or products…wholly new".[30] For this research, the degrees of innovation can be applied as follows: innovation within a certain terrorist organization, innovation in the field of terrorism, and innovation on the broadest specter.

Some researchers such as Fagerberg, draw the attention on distinguishing between invention, which is "the first occurrence of an idea for a new product or service" and innovation, which is "the first attempt to carry it out into practice".[31] While the distinction between invention and innovation is quite useful, the requirement of being "the first" is too rigid. Two organizations can both try to reach to a certain result by innovating, but just because one of them arrived one day sooner to that outcome as opposed to the second organization this does not mean that the second organization is not innovative. For example, in building hybrid automobiles for mass consumption Toyota was the first to achieve this, but soon enough, in a matter of a few months Audi achieved this too, and a few years later Honda.

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[29] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 40

[30] Fagerberg, Jan, Mowery, David C. and Richard L. Nelson. 2005. The Oxford Handbook of Innovation. New York: Oxford University Press Inc., p. 164-165

[31] Ibid. p.4

The definition used in this study will be somewhat more flexible and more proper by not emphasizing time so much. Sundbo defines innovation "as something that is new to the industry…,in the sense that no or very few firms have introduced it before".[32] Therefore, the definition of terrorist innovation will be: something new technologically, tactically, strategically or organizationally in the field of terrorism, with the mention that no or very few terrorist organizations introduced it.

Also, one has to make a distinction between incremental and radical innovation. Dolnik identifies as a radical innovation a new technology or tactic never used before by the organization, and an incremental innovation as an improvement in a technology or tactic.[33] Sundbo gives a few examples of radical innovation among which were the steam engine or the chip, and incremental innovation such as a faster PC.[34] Only by looking at the examples above, one realizes that radical innovation is almost impossible to realize in the field of terrorism, while incremental innovation is a much more realistic possibility. At least at the technological innovation level, a terrorist group can improve the accuracy of a weapon or can make a bomb become much more lethal by using a new component.

The present research will create a theoretical framework which is based on organization theory and innovation models. In addition, this research will use statistical data from 1970 until 2009. The time period is chosen because it can allow an analysis of the most recent type of terrorism. This research relies on the previous works of Jackson, Dolnik and Crenshaw, and is

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[32] Sundbo, Jon. 2001. The Strategic Management of Innovation. Cheltemham: Edward Elgar Publisher Limited, p.17

[33] Dolnik, Adam. p.6

[34] Sundbo, Jon. p. 34

meant to further their studies. This will give a much clearer picture about how terrorist organizations innovate.

The primary data sources used in the study are: Monterey WMD Terrorism Database of Center for Nonproliferation Studies (contains data on biological, chemical, radiological and nuclear weapons incidents; use of agent, attempted acquisition, possession, plot etc) and National Consortium for the Study of Terrorism and Responses to Terrorism Database (contains a database of global terrorism incidents with approximately 80,000 attacks in various regions and countries, and also weapon type used, target type, attack type, perpetrator). Besides the aforementioned data sources, the study will use some of the information found in several books and articles that deal with terrorist innovation or that have a subject relevant to this topic. The data will be analyzed and observations will be issued on whether a group is innovative tactically, strategically, technologically and/or organizationally, or whether it is not innovative at all.

The results expected from the study are that the factors borrowed from organizational and innovation theories will affect whether and how terrorist organizations innovate. It is anticipated that some terrorist groups are innovative tactically, while others are innovative strategically. In addition, some groups are innovative technologically, while others are innovative organizationally. Moreover, some terrorist groups might be classified in only one category, while other groups can be part of two, three or even all four categories of innovation. By finding out which terrorist organizations are more likely to innovate and how they do it, experts in this field can find solutions. It is important to know how terrorist organizations innovate, because not stopping them at the right moment can mean the loss of numerous lives or great material damages.

Chapter 2: Theory

This research will be based on organizational theory and innovation theory. Terrorist organizations innovate similarly to public and private organizations. Their main goal is survival. According to Sundbo, through innovation, organizations are fighting for survival and growth.[35] Hall too agrees with this statement and he is convinced that innovation and change "are at the heart of our overall interest in effectiveness. They contribute to growth, survival, and death."[36] Therefore, survival is the main goal because it is a precondition for trying to attain any other goals. Terrorist organizations are almost always concerned with hiding because somebody somewhere wants to capture or destroy them. The law enforcement, counterterrorist organizations and the military try through various ways to put an end to terrorism in the regions they have jurisdiction and when they have orders to carry this out.

Terrorist organizations usually show their effectiveness by being capable of carrying various successful terror acts. Growth can be attained only after the organization is able to capitalize on its publicity which comes mainly from carrying attacks. The more spectacular the attacks, the more publicity a terrorist organization receives. This in turn, will show people who share the same ideas with the terrorist organization that it has power and will convince more and more people to join the organization.

The terrorist organization receives publicity through the mass-media which shows the aftermaths of such attacks to various populations who watch the news. However, spectacular

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[35] Sundbo, Jon. p. 165-166

[36] Hall, Richard. 1999. Organizations: Structures, Processes and Outcomes. Upper Saddle River: Prentice Hall, p.203

attacks and innovative successful attacks bring prestige among peers and among supporters for the organization who perpetrated such attacks. As was noted earlier in the paper, "acquiring prestige is the cheapest way of acquiring power."[37] If a terrorist organization acquires prestige among peers and supporters, it only makes it easier for it to gain more recruits, more financial support, more safe havens and overall all this can be transformed into more power. Thus, it is important to weaken or stop terrorist innovation capabilities, because this will decrease their potential to grow and at the same time can threaten their existence.

Moreover, the characteristics of the innovation are extremely important. According to Hall, innovations are not adopted automatically and depending on the innovations' characteristics, the organization will decide whether to adopt it or not.[38] Hall identifies 19 characteristics of the innovation from Zaltman, Duncan and Holbeck's work. However, only some of these factors are relevant to terrorist innovation and are more important, among which are:

"1. Cost. Cost factors involve two elements, the economic and the social. Economic costs include the initial cost of adopting an innovation…and the continuing costs of keeping it in operation. Social costs involve changed status arrangements within the organization as individuals and groups gain or lose more power because of the new developments…

2. Return on Investment. It is obvious that innovations will be selected that will yield high returns on investments…

3. Efficiency. The more efficient innovation will be selected over the less efficient status quo situation or alternative innovation.

4. Risk and Uncertainty. The less the risk and uncertainty, the greater the likelihood of adopting an innovation…

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[37]Thompson, James D. p.33

[38] Hall, Richard. p.198,200

5. Complexity. More complex innovations are less likely to be adopted."[39] So, the characteristics of an innovation will influence terrorist organizations in deciding whether it is worth it or not to innovate.

A terrorist organization will always look at the economic costs when faced with the decision to adopt an innovation or not. For example, there is a lot of talk about the threat of terrorist organizations being able to build a Weapon of Mass Destruction such as a nuclear bomb. Although hiring a scientist would not be too expensive, buying uranium or plutonium would certainly require a lot of money. So, even if an organization wants to develop a WMD, without having enough resources it will never be able to do so. Also, even if the organization has enough resources it is doubtful that it will use a large amount of money on an innovation by risking to tremendously weaken its own financial status.

With regards to social costs, the status change and the opportunity of certain individuals to gain more power than the others within the organization can lead to conflicts sometimes. These conflicts can weaken the organization if certain important individuals splinter from it and form their own organization which quite often becomes a competitor. Also, martyrs who commit suicide bombings or decide to get involved in suicide missions receive an elevated status within the organization and within the community from which they are part. Many of the martyrs who carry terror attacks are volunteers. However, if an organization has to draw a suicide bomber from amongst the main people of the organization, this can cost them too because they will lose experienced fighters. Therefore, both economic and social costs have to be taken in consideration when a group decides to innovate.

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[39] Ibid. p. 198-199

Returns on investment in the world of terrorism cannot be measured in profit. The easiest way to measure the return will be by weighing the amount of media time, by the number of casualties or material damages produced by the innovation. Weinberg compares the low cost that Al Qaeda related groups incur in Iraq in carrying their attacks against the United States versus the billions of dollars the US has to spend in order to maintain its military in that country.[40] The more unstable Iraq is and the more attacks occur against the US, the more money and more troops the US has to keep in Iraq. Similarly, tens of thousands of troops are currently deployed in Afghanistan in search of Al Qaeda.

An innovative and extremely lethal attack took place on September 11, 2001 when Al Qaeda members drove two hijacked planes into the World Trade Center Towers, one plane into the Pentagon and one crashed in Pennsylvania which all lead to the death of approximately 3,000 people. Probably the most money this terrorist organization spent on the attack was on the perpetrators plane tickets and on some of their flight lessons. However, the publicity they received in exchange was quite unmatched. The lethality, the publicity and the material damage produced was something unseen before.

The US started two wars, one with Iraq and one with Afghanistan in order to eradicate this organization and to weaken its supporters. Although Al Qaeda did not have a strong presence in Iraq, after the US troops arrived in this country Al Qaeda too strengthened its presence there. Afghanistan is quite another matter. This organization has its roots in Afghanistan and Pakistan, and it used these areas as safe havens for a long time. The US incurs huge costs to maintain its military in Iraq and Afghanistan, and also it has to provide financial support for the Iraqi

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[40] Weinberg, Leonard. 2005. Global Terrorism: A Beginner's Guide. Oxford: Oneworld, p. 96

government, the Afghani government and various forms of aid to the Pakistanis too. Thus, a fairly cheap attack has caused the US to react by overextending militarily and by spending large amounts of its finances.

Efficiency is an important characteristic too. If an organization can use a weapon with higher capability, such as more precise and longer range weapon instead of something less reliable it will use it. For example, in 2002 a Tanzim sniper was able to kill ten Israeli citizens at a West Bank checkpoint and to escape afterwards.[41] The attack was quite efficient. Not only did the perpetrator kill ten people by himself, but he was also able to leave his hideout without being caught. Although the AK 47s seem to be one of the most popular firearms used by terrorist organizations, they are more reliable on close range. But being closer to the target increases the risk of the perpetrator being detected easier and being shot himself in the fight. However, sniper type of rifles are typically more expensive, require more maintenance, and much more training than AK 47s.

A terrorist organization can weigh efficiency on various levels. They can improve efficiency not only by using an innovative technology, tactic, or strategy, but also by adopting a new form of organization. Recently, some terrorist organizations chose a more decentralized structure instead of a centralized and very hierarchical one. It can help the organization to administer itself better. Certain cells can carry certain type of attacks, while others can carry a different type of attack or be in charge of recruiting or gathering more funds. Efficiency, just like costs and returns proves to be an important characteristic too with regards to influencing the decision to innovate.

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[41] Dolnik, Adam. p.26

Moreover, risk and uncertainty can influence an organization whether to innovate or not. Although terrorism is already a risky business, each organization has its own limits when it comes to risk and uncertainty. It is definitely not the same thing handling WMD type of weapons as opposed to arson bombs or some kind of firearms. Given the fact that chemical, biological, radiological, or nuclear weapons present a high risk and degree of uncertainty for terrorist organizations, they are weapons that terrorize the minds of the terrorists themselves. This does not mean that will stop all terrorist organizations from trying to build or acquire such weapons. Some organizations tolerate more risks than the others.

Uncertainty can ensue if an organization does not know what the effects of the innovation will be. What if the new bomb, for example, is too powerful? What if the new structure, tactic, or strategy will weaken the organization instead of strengthening it? Certain organizations do not want to send the wrong message. One just needs to recall the train bombings in Madrid in March 2004 by an Al Qaeda inspired group. Many people suspected ETA initially as responsible for the attacks, but even ETA sought to distance itself from the attack. ETA knew that claiming responsibility for such a lethal and indiscriminate attack would certainly alienate its support base in the Basque country region of Spain. ETA usually sends messages by less destructive bombs. However, other organizations such as the Liberation Tigers of Tamil Eelam (LTTE) or Al Qaeda are willing to take more risks and have a better tolerance for uncertainty. For the last two organizations, sending a member or a volunteer suicide bomber on a mission does not equate with too much risk or uncertainty. On the other hand, organizations like ETA or RAF would never risk the life of a member by sending him packed with bombs to commit a suicide attack against the perceived enemy.

In addition to the innovation characteristics already mentioned, complexity also influences the decision to whether to innovate or not. Not all terrorist organizations have the same capability. A terrorist group that carries out mainly assassinations and arson attacks will not need to adopt very complex innovations. If the new potential technology, tactic, strategy or structure is way beyond the capacity or at least appears to be far from being achievable, the terrorist organization will be much more content to adopt an innovation that is less complex, but which is within its reach. Besides this, familiarity with certain technologies, for example, will increase the chances of that certain organization to improve that particular technology. So, incremental innovation is much more likely to prevail over radical innovation.

Complexity can lead to frustrating results for terrorist organizations. Attempting to adopt a very complex innovation can require a lot of time, a lot of money, a lot of knowledge, and even so the result might be deplorable. The very complex innovation might not deliver the expected result. Therefore, terrorist organizations have a better chance in innovating incrementally something that works, but that will work even better.

Besides the characteristics of the innovation, there are other factors that influence how terrorist organizations innovate. Among these factors are: leadership, environment, goals and crisis situations. Terrorist organizations have different type of leaders, are present in various environments, are pursuing more or less ambitious goals, and at certain points in time are faced with crisis situations.

Schumpeter, the "father of the innovation theory", draws the conclusion initially that entrepreneurship leads to innovation, but building on this idea Kirzner in the 1970s emphasized

the entrepreneur as a "coordinator and decision-maker."[42] In these circumstances, the entrepreneur is a leader. He is the most important component of an organization, because he shows the direction on which the organization has to go. Even if an organization has the money, the time and the specialized personnel that can innovate effectively, the ultimate decision is up to the leader to whether to go through or not with the innovation.

The leader/entrepreneur can take the decision alone or after consulting with other members from the leadership. It is not important if the leader is authoritarian or more democratic, he is important as a decision maker. Dolnik, for example, believes that "highly autocratic organizations" are less likely to innovate.[43] However, organizations and even countries that have autocratic leaders do innovate, but they do so in the field the leader wants innovation to be conducted. The Soviet Union in its arms race with the United States chose to emphasize innovation in the military field. The Soviet Union perceiving the US as the greatest threat was able for several decades to develop new and highly sophisticated weaponry. Moreover, by sending into space the first artificial satellite to orbit the Earth worried the US that Soviet Union has this capability. Therefore, if the leader decides to innovate in a certain direction and he knows that capability exists then the organization will follow his decision.

Another factor that affects innovation is the terrorist organization's environment. An environment has several aspects: it can be friendly or hostile, but also competitive and demographically homogeneous or heterogeneous.[44] Afuah also mentions two important aspects

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[42] Sundbo, Jon. p. 12

[43] Dolnik, Adam. p. 20

[44] Hall, Richard. p. 94-95

of the environment: skilled people available and rivalry.[45] In a competitive environment

organizations tend to be more innovative, because rivals can build on each other's knowledge

and also each organization will fight harder for survival.[46] Thus, the environment can influence

innovations in multiple ways.

A friendly environment can allow more time for innovations, but a hostile environment

can be more motivating to innovate. Also, an environment which is composed of a population

that shares the same ethnicity with the terrorist organization members or which has supporters

instead of enemies will be less likely to reveal authorities any suspect activities. Similarly, an

organization which can draw members from an environment with skilled people can innovate

easier. Having doctors, engineers, chemists, biologists or former military and police officers will

more likely help the innovation process, in contrast to an environment that lacks such skilled

people. Rivalry usually ensues between organizations which fight not only for survival, but also

for the same population, cause or goals. However, innovation can take place also in a friendly

environment by terrorist groups exchanging technologies or tactics, or any other information that

can lead to innovation.

The organization's goals have an impact on terrorist innovation too. Hall cites Simon

according to whom "goals are constraints for organizational decision making."[47] Some

organizations just want to survive and draw the public attention to their concern from time to

time and they might not have the same interest in innovating if all this can be done with their

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[45] Afuah, Allan.1998. Innovation Management: Strategies, Implementation, and Profits. New York: Oxford University Press, p. 27

[46] Ibid. p.27-28

[47] Hall, Richard. p. 284

existing technology, tactics, strategy, or structure. On the other hand, other terrorist organizations have much higher goals and in order to achieve them they need to be more innovative.

For example, an organization that fights for a national homeland or for establishing religious regimes in various countries will need a lot of power in trying to reach this type of goals. These organizations will need many recruits, but at the same time they have all the reasons to innovate in order to build weapons with much higher destruction capability. Terrorist organizations with higher goals are constrained to lead bloodier campaigns against the perceived enemy population. If they have a more moderate campaign or use less lethal methods, these terrorist organizations might still remain in business but with less power and gradually their campaigns might fade away.

Organizations that merely want to punish certain "capitalists" or to influence the policy in a country do not really need to innovate in order to acquire huge destruction capacities. For these goals, an organization can use a simple firearm or a bomb if assassination of wealthy "capitalists" is the goal or can commit arsons in order to influence policy on environmental issues. Such organizations will never try to acquire a WMD type of weapon, because it is beyond their goals. They do not need to use a WMD to signify their disapproval of how some people behave or their disapproval of policies. Using a high destruction capacity by an environmental terrorist organization would only backfire against it. Not only that a large bomb or a nuclear bomb would destroy the exact environment they are trying to protect, but would certainly alienate many supporters too. However, these organizations will be likely to innovate organizationally by adopting new structures in order to survive.

Another factor that influences terrorist innovation is the crisis situation. An organization can innovate suddenly, especially strategically and organizationally when "periods of

environmental turbulence" occur.[48] A crisis situation can ensue from various reasons such as for example: the assassination or imprisonment of a terrorist leader, the organization runs out of money, its effectiveness drops due to better law enforcement, its tactics and strategy seem to backfire or the safe haven is suddenly full of the opposing forces' military. These are only some of the crisis situations a terrorist organization might have to confront.

In order to overcome the crisis, the organization will have to innovate. For example, if a leader is imprisoned, an organization might employ a new tactic that has never considered using before. It might also become more desperate and risk much more by increasing the lethality of the attacks or by attacking targets that have never been considered before. The new main goal will be the freedom of the leader instead of national liberation or some other type of goals. This can lead to a new strategy.

In addition, running out of money can cripple the organization. If it no longer can get money from charities or supporters, the organization will have to find a new way to gather funds. The organization can employ kidnapping for ransom to gather more money, or engage in bank robberies to overcome the crisis. Also, when law enforcement finds a way to deter terrorist attacks, the organization will try to innovate to still show that it has the capability of carrying attacks. Moreover, confronting a large military presence in their previously considered safe haven can make the organization adopt a new structure that is more appropriate for the new situation it found itself. So, if an organization is confronted with a crisis it is quite likely that it will have to innovate to get out of it.

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[48] Fagerberg, Jan, Mowery, David C. and Richard L. Nelson. p. 135

So, the characteristics of the innovation will influence whether an innovation will be adopted or not, but terrorist innovation also relies on several other factors. The most important characteristics of the innovation are cost, returns, efficiency, risk and uncertainty, and complexity. In addition to these characteristics, there are other factors such as leadership, environment, goals and crisis situations which influence how terrorist organizations innovate. By applying the propositions from organizational and innovation theories to the four types of innovation, technological, tactical, strategic and organizational respectively, one will have an improved assessment of how terrorist organizations innovate.

Chapter 3: Technological Innovation

Terrorist organizations innovate technologically, tactically, strategically, and organizationally. A terrorist organization is engaged in technological innovation when it creates a new weapon, improves an existing weapon, or acquires a new weapon and it is among the first organizations to do so. Also a new instrument that is not necessarily a weapon, but which can aid in various ways terrorist operations can be considered a technological innovation. Some of the weapons used by terrorists are knives and other sharp objects, incendiary weapons, explosives, firearms, biological agent, chemical agent, radiological agent, and others. The characteristics of the technological innovation and of the organization itself will influence whether an innovation will be adopted or not and how innovation will be conducted.

The cost of the new technology will always have a great influence on the organization which contemplates to innovate. There are not too many organizations that can afford developing a chemical, biological or radiological weapon with high destruction capability. Until today, no terrorist organization was able to use a nuclear weapon. The costs associated with building these weapons are very high. Aum Shinrikyo was one of the few groups that afforded the costs of creating a chemical warfare agent, sarin. Aum Shinrikyo was an organization with over $1 billion in assets and invested around $30 million in this nerve agent which killed only 12 people.[49] Other groups that could potentially afford such costs are Al Qaeda and the Revolutionary Armed Forces of Colombia (FARC), and until a few months ago the Liberation Tigers of Tamil Eelam (LTTE) which was defeated.

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[49]Dolnik, Adam. p. 46

These groups are all large and have important sources of finances. Al Qaeda's leader, Osama Bin Laden is estimated to have inherited about $250-$500 million of his family's total of $10 billion.[50] In addition to Bin Laden's own personal fortune, the organization receives financial support from various wealthy people usually from the Middle East and from Muslim charities. The Revolutionary Armed Force of Colombia not only that has almost 20,000 fighters at present, but also has about $170 million in drug revenues per year.[51] The Liberation Tigers of Tamil Eelam too was a large organization with about 15,000-20,000 members and an annual revenue of about $60 million, which was mainly funded by Tamils who work abroad and by various Tamil organizations such as the Federation of Association of Canadian Tamils, the Tamil Rehabilitation Organization in France, the Tamil Housing Association and others.[52] Thus, these strong and rich organizations can afford extremely expensive weapons.

Besides organizations such as Aum Shinrikyo, Al Qaeda, the Liberation Tigers of Tamil Eelam (LTTE) and the Revolutionary Armed Forces of Colombia (FARC) are also many organizations that have state sponsors. The Popular Front for the Liberation of Palestine-General Command is sponsored by Syria and Hezbollah is sponsored by Iran. They could acquire a WMD type of weapon from their sponsors, but neither Syria nor Iran are ready to face retaliation from Israel and its long time ally the United States in such circumstances. On the other hand, terrorist organizations that lack sponsors or a steady flow of huge financial revenue have to rely on bank robberies or kidnapping for ransom in order to survive and to be able to still carry attacks. Their technological innovation will be less complex if it ever occurs at all.

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[50] Steven Graeme C.S. and Rohan Gunaratna. p. 151

[51] Cragin, Kim, Chalk, Peter, A. Daly, Sara and Brian A. Jackson. p. 76

[52] Steven Graeme C.S. and Rohan Gunaratna. p. 198-205

New technologies that are less costly have much better chances of being adopted by terrorist organizations. Developing a Web site or communicating through email or in a chat room are just some of the new opportunities available to terrorist organizations through the Internet. Terrorist organizations can innovate by creating their own Web site for various purposes with very few costs. Their Web sites are typically created by supporters or sympathizers who have some web design knowledge or by a member of the organization. The highest costs associated with creating a Web site are probably acquiring a domain and hosting the Web site on a server. These costs can be as low as a few hundred dollars.

Terrorist organizations started building their own Web sites in the 1990s. According to Hoffman, among the first to do so were the Zapatista National Liberation Army (EZLN) and the LTTE.[53] Moreover, Weimann who conducted a detailed study about terrorists' use of the Internet found that it has several uses such as: information gathering, fund raising, actions coordination, recruitment, propaganda, distribution of manuals and instructions.[54] The Internet is a new and very powerful instrument that terrorist organizations around the world stated to use due to its advantages. The Internet, as a new instrument that terrorists can use with very few costs has influenced how many organizations can improve their operations.

The Internet contains huge amounts of information. Terrorist organizations can find the information they seek very easily on the Internet with the help of search engines. For example, Donald Rumsfeld explains how an Al Qeada training manual found in Afghanistan teaches members that "using public sources openly and without resorting to illegal means, it is possible

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[53] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 202-205

[54] Weimann, Gabriel. 2006. Terror on the Internet: the New Arena, the New Challenges. Washington, DC: United States Institute of Peace Press, p. 7, 49-145

to gather at least 80 percent of all information required about the enemy."[55] So, just by spending some time to find the information needed the potential terrorist can find most of what he is looking for. Through the Internet terrorist organizations find information about location of targets, security, and can asses if and how to carry an attack. For example through Google maps or Yahoo maps can prepare the attack plans without being necessary to scout the area before.

Raising funds through the Internet is also extremely low cost. Once a terrorist organization builds a website or contacts potential donors through chat rooms he just needs to give the bank account information or to reveal to the donor any other method in which he can contribute. According to Weimann, Al Qaeda and Hamas are two of the most "active fund-raisers on the Internet," with Hamas's military wing the Al Qassam Brigades even explaining how the donations will be spent:

"donate with what you can to assist the cause of Jihad and resistance until the occupation is eliminated and every span of the Muslim Palestine is liberated…The price of Kalashnikov bullet is $3 and the price of the Kalashnikov gun itself now is $2,000 and it was $3,500 couple of months ago, and do you know that the price of RPG is $12,000 and the price of TNT…is $100 kilo."[56]

Al Qassam Brigades, not only that asks for donations, but also promises to use the money on much needed supply, weapons of various types. Hamas explains the whole process with much openness.

The Internet also plays an important role terrorist planning and coordinating. Weimann mentions that the September 11 operatives "relied heavily on the Internet in planning and coordinating the September 11 attacks" by searching for time flights and routes, and exchanging

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[55] Ibid. p. 112

[56] Ibid. p. 135-136

emails.[57] Moreover, Mohammed Atta's last message to the other 18 terrorist was: "The semester begins in three more weeks. We've obtained 19 confirmations for studies in the faculty of law, the faculty of urban planning, the faculty of fine arts, and the faculty of engineering."[58] The leader of the 19 hijackers of the planes on September 11 uses this email to coordinate all the members and to prepare them to strike at the right moment. By using email the message was transmitted within seconds to the other people involved in the attacks.

So, the Internet with its Web sites, chat rooms, emailing opportunities and many other uses proved to be a valuable instrument for terrorist organizations. With very few costs by using this new instrument with its various applications terrorist organizations were able to plan attacks and coordinate their members, to recruit, to ask for donations, to distribute manuals and to gather useful information. The multiple uses of the Internet and the low costs associated with them made it very popular among terrorists.

With regards to social costs of technological innovation, members of various organizations might be worried not to lose their status within the organization. For example, the image of the rank and file Jihad warrior with his AK -47 in his hand or with his sword can be highly reduced by Al Qaeda hiring a scientist to help this organization develop a WMD weapon. The Jihad warrior might find himself less relevant to the organization.

Aum Shinrikyo received a lot of publicity after the Tokyo subway attacks. However, when one considers the returns of innovation for developing the sarin gas, it is not hard to realize that at least in trying to achieve an increased lethality Aum overspent its money. Spending $30 million in order to kill 12 people was clearly a bad return on investment. This means that taking

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[57] Ibid. p. 129-130

[58] Ibid. p. 132

one life cost $2.5 million. The same result, killing 12 people can be achieved with an AK-47 or a bomb which would not require more than a few hundred dollars.

However, innovative technologies that bring the sought return did exist. Black September managed to assassinate an Israeli diplomatic official in 1972 in London and IRA assassinated a government official in 1973 in London too, both by sending each a letter bomb.[59] A letter bomb usually requires a small amount of explosive, is cheap and once it is packaged it is easy to use. By sending a letter bomb the perpetrator does not have to worry too much about being caught, because obviously he will not leave his name and address on the letter. So, it is an easy way to obtain the return on investment without being necessary to be near the target. It can be done from hundreds or tens of miles away.

The Popular Front for the Liberation of Palestine-General Command (PFLP-GC) is also a good example of how to innovate to obtain a return on investment. Marwan Kreeshat, one of the best PFLP-GC bomb makers was able to create the altimeter bomb, which allowed this organization to bring down planes in mid-course flight.[60] In 1970 due to the placement of altimeter bombs activated by barometric pressure mechanisms at 14,000 feet altitude on two flights, a Swissair plane crashed killing 47 people and an Austrian Airlines plane heading towards Vienna was able to land safely after the explosion.[61] This technological innovation was able to bypass air security and what is even more horrific is that the passengers on the Swissair

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[59] http://www.start.umd.edu/gtd/search/Results.aspx?page=1&search=letter bomb&charttype=line&chart=overtime&ob=GTDID&od=asc&expanded=yes#results-table Accessed on November 7, 2009.

[60] Dolnik, Adam. p. 82.

[61] Ibid. p. 82-83

flight had no chance of survival once the bomb exploded at such high altitude. This innovative bomb and the incidents in which it was used brought a lot of publicity to PFLP-GC.

Bombs are among the most efficient weapons used by terrorists. They have been used in about half of the terrorist attacks since 1968.[62] One of the most "archaic" explosive is dynamite. However, bombs have been improved over the years and recently can be found under various forms such as plastic, liquid and even cotton. Moreover, many new and various detonation systems are available such as clocks, cell phones, remote control, radar and others. By adding a new detonation system even to an "archaic" explosive as dynamite, the new product will be much improved. It can deliver the result in an easier way and from a safer distance.

A good example of efficiency is the bomb created by the right wing terrorist, Timothy McVeigh. He is responsible for the destruction of the Murrah Federal Building in Oklahoma City and the killing of approximately 200 people, by detonating a truck bomb composed of ammonium nitrate and fuel oil.[63] Ammonium nitrate is a fertilizer. It is much cheaper than the conventional explosives used in bomb manufacturing, because its primary use is in agriculture and not in killing people or destroying property. However, although the ammonium nitrate was quite cheap, the power and the efficiency of this bomb cannot be contested. Not only did it kill a large number of people, but it also created property damage of a few hundred million dollars by destroying the federal building and the surrounding buildings.

Another good example of efficient use of a new type of explosive is the Lockerbie incident. In 1988 Pan Am flight 103 was brought down by half a pound of Semtex (plastic)

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[62] Hoffman, Bruce. 1992. Terrorist Targeting: Tactics, Trends, and Potentialities. Santa Monica: RAND, p.1-2

[63] Weinberg, Leonard. 2008. Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate. p. 14 Accessed on May 12, 2009 at http://www.terrorismanalysts.com/pt/index.php?option=com_rokzine&view=article&id=58

explosive in the Lockerbie area causing 270 deaths.[64] This incident reveals how efficient it can be to use Semtex explosive. An extremely small amount of this type of explosive was responsible for the destruction of a plane and for taking the lives of so many people. However, efficiency cannot be demonstrated solely by numbers. For example in 1971 the IRA used sniper rifles in 18 attacks against British military personnel, out of which 17 ended with one kill and 1 ended with two deaths.[65] From a safe distance, IRA fighters were able to use sniper rifles with not too many casualties, but with extreme efficiency. All 18 attacks had a 100 percent success rate.

Risk and uncertainty also influence technological innovation. The riskier the technology and the more uncertain the potential results, the less likely that a new technology will be sought and employed. Aum Shinrikyo was one of the few organizations that had a high risk tolerance. Aum used in some attacks highly dangerous nerve agents such as sarin and VX. Experimenting with this kind of chemical warfare agents is not the same thing with handling a knife or a gun. A simple mistake can kill easily and very rapidly the persons working or trying to conduct attacks with such agents.

Moreover, biological agents are just as dangerous as chemical agents. However, this did not stop Aum Shinrikyo from sending a team of doctors to Zaire and trying to bring back some samples of Ebola virus in 1993.[66] Ebola virus causes a viral hemorrhagic fever and an outbreak

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[64] Dolnik, Adam. p.36

[65] http://www.start.umd.edu/gtd/search/Results.aspx?expanded=no&search=sniper&ob=GTDID&od=asc&page=1&count=100 Accessed on November, 7, 2009.

[66] Ghosh, Tushar K., Prelas, Mark A., Viswanath, Dabir S., and Sudarshan K. Loyalka. p. 80

can have mortality rate of up to 90 percent.[67] A person infected with Ebola has a painful death and what is more dangerous is that it can be passed from one person to another. Thus, if a person from the organization becomes infected, especially without knowing, he or she can infect the others too and this can mean a disaster for the organization.

It can be risky handling bombs too, not necessarily only CBRN weapons. From 1969 until 1996, over 120 IRA members died during bomb assembly processes especially due to timing and detonation problems.[68] Judging by the number of IRA members dying in bomb manufacturing accidents it is clear that the group tolerated risk quite well. The number of accidental deaths did not prove to be discouraging for the IRA. This risk tolerance only aided IRA's technological innovations during this period, which were especially in bomb assembling and detonation.

Terrorist organizations that tolerate well uncertainty are more innovative. There is a lot of uncertainty around nuclear weapons. No terrorist organization has ever used a nuclear weapon. However, Al Qaeda in 1990s attempted to purchase uranium from South Africa and enriched uranium from Germany.[69] In addition to trying to purchase these important components of a nuclear weapon, Al Qaeda also acquired instructions for developing such a weapons and hired Abdul Majeed and Sultan Bashiruddin Mahmood, two Pakistany nuclear experts.[70] So, even if there is a lot of uncertainty surrounding the developing and using of a nuclear weapon, Al Qaeda is not bothered by it and is trying to build a nuclear weapon. Of course, creating a nuclear weapon requires a lot of time, money, scientists and components. Al Qaeda had the instructions,

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[67] Ibid. p. 80-81

[68] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 252

[69] Ibid. p. 273

[70] Ibid. p. 273-274

the scientists, the money, but there is no clear evidence yet to whether it acquired the components (e.g. uranium or plutonium) for the nuclear weapon and if it is in any stage of development.

Using a nuclear weapon or a potent CBR weapon can also bring a massive response from the country or the population that suffered or would have to suffer from it. After the sarin gas attacks on Tokyo subway system by Aum Shinrikyo, the Japanese law enforcement authorities gave a massive response by arresting the Aum's leadership and members who had an involvement in these attacks. The organization suffered enormously and many members became disillusioned by Aum. The same thing can happen to any other highly innovative organization. Usually a powerful attack is followed with an even more powerful response on the authorities' part.

The complexity of the pursued technological innovation influences how the innovation will be attempted or whether it will be attempted. Most organizations will innovate if the technology is less complex. This does not mean that all innovations will lack high complexity. Some organizations will have higher capabilities to innovate more complexly than others. An organization is usually more confident in improving a weapon that is in its use. That is why IRA was able to improve its bombs. Among some of IRAs technological innovations are time delay and remote detonators, booby traps and blast accentuators.[71] There are other terrorist organizations who improved their bombs too. For example, Hamas, Al Aqsa Martyrs Brigade and Palestinian Islamic Jihad added an anticoagulant to their bombs to make sure that the injured will not stop bleeding.[72] All of these organizations improved the bombs they had used initially.

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[71] Dolnik, Adam. p. 57

[72] Steven Graeme C.S. and Rohan Gunaratna. p. 51

IRA improved the detonation system and the power of its bombs. Hamas, Palestinian Islamic Jihad and Al Aqsa Martyrs by adding the anticoagulant, increased the likelihood that more people will die following the explosion.

Another organization experienced with various types of explosives is Al Qaeda. Purpura explains how this organization trains its members to produce a:

"cotton-like explosive that can be placed inside clothes, toys, and pillows. The explosive is made by mixing nitric acid with cotton and then adding nitroglycerine. The end product is called nitrocellulose that can be lit to cause an explosion. Although X-ray machines cannot detect this explosive, trace detection machines can detect the substance."[73] Nitrocellulose is easy to conceal and raises few suspicions under its form. Not having a trace detection machine in an airport or in important buildings such as museums, courtrooms or federal buildings can mean unpreparedness to counter such explosives.

Moreover, Jose Padilla a US citizen trained by Al Qaeda planned to rent several apartments in high-rise buildings, to turn the gas on and to detonate all these rented apartments by using a timer.[74] This remained at the stage of invention, because it was never carried through. However, producing such an explosion does not seem too complicated and the results can be devastating. So, even with a less sophisticated explosion, terrorists can still innovate technologically.

There are other less sophisticated innovations too. Red Army Faction (RAF) members used a special ointment which prevented the German police from identifying their fingerprints.[75] Another organization, LTTE required its members to wear vial of cyanide, which they had to bite

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[73] Purpura, Philip P. 2007. Terrorism and Homeland Security: An Introduction with Applications. Burlington:Elsevier, Inc. p. 56

[74] Ibid. p.55

[75] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 250

in order for the small pieces of the glass to cause laceration and to allow the poison into the bloodstream in order to avoid capture.[76] Thus, two innovative technologies, of not too great complexity, are used by both organizations with the purpose to protect themselves. While RAF does not want its members to commit suicide in order to protect the organization, LTTE required their members to use cyanide so that they could die along with everything they knew about the organization, thus making the law enforcement agencies' job extremely difficult.

However, the Liberation Tigers of Tamil Eelam (LTTE) was one of the most technologically innovative terrorist organizations. Not only that the LTTE developed the suicide belt, but it also developed many complex innovations. The LTTE created floating mines, underwater explosive devices, and even three mini-submarines[77] and two airfields for their miniature airplanes.[78] Moreover, this organization developed a remote-controlled boat that can be loaded with explosives and guided to fit next to the hull of a ship.[79] The technological innovations of the LTTE were quite complex. There is no other terrorist organization that had ever built its own submarine. That is not an easy task. The crew needs to be able to breathe inside the submarine, the submarine needs to be well sealed and to be built so that it can resist underwater pressure. Creating a submarine is not as easy as building a boat. Moreover, while assembling explosive devices to work on land is not too difficult, creating underwater explosive

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[76] Pape, Robert A. p. 143

[77]Steven Graeme C.S. and Rohan Gunaratna. p. 201

[78] Crenshaw, Martha and John Pimlott et al. 1997. Encyclopedia of World Terrorism. Armonk: ME Sharpe, Inc. p.475

[79] http://www.nytimes.com/2009/10/29/world/29military.html?_r=1&partner=rss&emc=rss&src=ig "Makeshift Bombs Spread Beyond Afghanistan, Iraq" By Tom Shanker Accessed October 28,2009.

devices is quite another matter. So, it is clear that the LTTE was in a league of its own with regards to technological innovations. It was one of the few organizations with high capability for complex innovations.

Furthermore, leadership is also important in technological innovation. The leader/entrepreneur is important as a decision-maker and as a direction setter. The leader can decide to whether to innovate or not, and how to do so if the decision is affirmative. The leader can set a clear direction in which way to innovate regardless of his democratic or autocratic style.

Ahmed Jibril, the leader of PFLP-GC wanted to bring down planes in mid-course flight and ordered his bomb maker, Marwan Kreeshat to build the altimeter bomb.[80] Jibril, as a leader, decided that it was the time for his organization to innovate. Not only that he wanted his organization to innovate, but he also showed the direction in which the technological innovation to be carried. Thus the PFLC-GC had clear directions from its leader that a new bomb was needed for the purpose of bringing down a plane in mid-course air.

Another important leader/entrepreneur was Shoko Asahara of Aum Shinrikyo. He decided that the potential technological innovations have to be able to cause mass damage. Therefore, Aum did not waste time on attempting to improve bombs or firearms. This organization had to innovate in a big way. Besides chemical, biological and nuclear weapons, Asahara also expressed an interest in futuristic weapons such as plasma, seismological and laser weapons, and asked his research teams to look into these potential innovations.[81] Just like Jibril, Asahara not only that decided it is time for his organization to innovate, but also showed the direction innovation should focus on.

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[80]Dolnik, Adam. p. 82

[81] Ibid. p. 70

Moreover, the LTTE leader Vellupillai Prabhakaran also decided to innovate and to show the direction to do so. Prabhakaran chose Moorthy Master to be in charge of LTTEs "research and development" section and the later was the one who carried the project of submarine building through.[82] Prabhakaran was extremely ambitious and the technological innovations the LTTE developed reflected this too.

In addition, IRA leaders such as John Kelly also allowed technological innovation to take place. The fact that the IRA was an extremely innovative organization and it limited its innovativeness especially in bomb making and explosives use in general, shows that the IRA leadership was in favor of drawing the public's attention to their problems, but their actions are far from being indiscriminate in comparison with the most recent Jihad organizations such as Al Qaeda. John Kelly became an assembly member representing Mid-Ulster in 1996.[83] He seems to be more democratic than the other three leaders Jibril, Asahara and Prabhakaran, since he also accepted later to be part of a democratic process, but altogether they were important as decision makers and direction setters.

With regards to the environment, a terrorist organization that is present in a hostile environment with rivals and/or enemies will tend to be more innovative. The IRA (PIRA) for example coexisted at different points in time in an en environment with rivals such as the Official IRA, Continuity IRA, with enemies such as the loyalists Ulster Freedom Fighters, Ulster Volunteer Force, Orange Volunteers, and the British military that was also present in Northern Ireland. Moreover, IRAs environment is composed of a heterogeneous population with Irish,

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[82]Steven Graeme C.S. and Rohan Gunaratna. p. 201-202

[83] http://www.start.umd.edu/start/data/tops/terrorist_organization_member.asp?id=81 Accessed on November 9, 2009

English, Scottish and Welsh, with the Irish population being also divided sharply into religious lines Catholic and Protestant.

With rivals in its environment and numerous enemies, the IRA had to fight hard for survival. Therefore the IRA had to innovate technologically in order to set itself apart from the other rival organizations and to show that it better represents the support population by emphasizing their distinction from rivals and their much higher potency. The IRA did not benefit from a friendly environment such as many Filipino organizations did. The IRA had to constantly fight for survival in a hostile environment. The IRA (PIRA) besides the numerous innovations already mentioned was also able to build the drogue grenade that could penetrate tanks and armored military carriers, and mines for vehicles targeting.[84] The environment affected how the innovation was supposed to follow. By using mines the IRA was able to strike at the British military and police by taking out the vehicles and the people in them. The fact that British military was driving in armored carriers and tanks presented an opportunity in the environment for the IRA and therefore this organization developed the drogue grenade to be able to inflict damage.

The LTTE also was influenced by the environment with regards to its technological innovation. The LTTE too, was operating in a hostile environment. This organization destroyed some other 30 Tamil terrorist groups between 1986 and1996, and also killed the leader of the Tamil United Liberation Front party.[85] The LTTEs hostile environment also had a Sinhalese military presence. Moreover, the environment was composed of two different populations the Tamils, who were mainly Hindus and the Sinhalese, who were mainly Buddhists. Most of the

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[84] Jackson, Brian A. p. 197

[85] Crenshaw, Martha and John Pimlott et al. p.474

LTTE leaders were from the "fisher"caste[86] and this together with the fact that Sri Lanka is an island provided this organization people who are experienced on the seas and oceans. The environment provided opportunities to innovate for LTTE too. Most of this organization's technological innovations such as the remote-controlled boat, the floating mines, the underwater explosive devices, the mini-submarines were related to the open seas.

The terrorist organizations' goals also influence how they innovate. Terrorist organizations which emphasized high lethality in achieving their goals tend to be quite innovative and they do so in a more complex way. Aum Shinrikyo, a religious cult was preaching the imminence of the apocalypse and in order to bring it about, this organization had to innovate technologically by trying to develop weapons of mass destruction such as sarin gas, VX, anthrax and Ebola virus. Aum had to develop a highly complex weapon in trying to achieve its goal. This organization was not interested in creating a less sophisticated technology. Only by using WMDs, the organization was able to pursue this goal.

In addition to Aum, Al Qaeda is another terrorist organization which in order to reestablish the caliphate tries to develop weapons with high destruction capability. It tried to acquire uranium and to build a nuclear weapon. It also transformed airplanes into weapons which caused somewhere around 3,000 deaths on September 11 2001 in the United States. So far, it was not able to develop a nuclear weapon, but the weapons it used were extremely lethal. Aum wanted to cause mass casualties and so does Al Qaeda, but their goals differ.

Terrorist organizations that fought or still fight for establishing a homeland for a certain nation can be just as deadly. The LTTE caused over 9,000 deaths and over 8,000 casualties since

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[86] Steven Graeme C.S. and Rohan Gunaratna. p. 199

its founding.[87] It is an extremely lethal organization and its technological innovations have helped them increase the destruction capabilities. Similarly, organizations such as Hamas and Palestinian Islamic Jihad fight for a homeland too, but they also emphasize the importance of Islam in their pursuits. So, the latter two organizations are both nationalist and religious. Hamas, is only one of the many Palestinian terrorist organization that fight for a homeland, but in the last 20 years it was responsible for over 700 deaths and over 2,200 casualties.[88] Therefore, organizations that are mainly trying to achieve religious and nationalist goals tend to be quite lethal and in trying to achieve those goals they will try to innovate technologically so that they can inflict more deaths.

Crisis situations can lead to technological innovations too. A terrorist group can lose its effectiveness if the law enforcement agencies diminish their ability to carry out attacks. A crisis can also ensue following the organization's loss of funding or imprisonment of its members. If a terrorist organization finds a weapon extremely efficient it will rely heavier on it than on other weapons.

The IRA created bombs that were activated by radio control, sophisticated electronic switches, radar gun and by a photo flash unit following British authorities' countermeasures.[89] Each time the British law enforcement found a way to diminish or to stop IRAs bombs to go off, the organization found itself in a crisis situation because it could no longer carry attacks and in this way it was losing the effectiveness it previously had. If the IRA would not have overcome

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[87] http://www.start.umd.edu/gtd/search/Results.aspx?chart=casualties&casualties_type=b&casualties_max=&dtp2=all&perpetrator=457 Accessed November 9, 2009.

[88] http://www.start.umd.edu/gtd/search/Results.aspx?chart=casualties&casualties_type=b&casualties_max=&dtp2=all&perpetrator=399 Accessed on November 9, 2009.

[89] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 252-253

the crisis situation each time, this could have brought the organization into irrelevance and slowly but surely death would have met this organization. However, each time the IRA entered a crisis it was able to get out of it.

The Red Army Faction (RAF) and the Liberation Tigers of Tamil Eelam (LTTE) also found themselves in crisis situations which made them innovate. After several arrests of some RAF members, the organization found itself into a crisis. All the other members were worried that soon they could be arrested too, but they managed to avoid being captured but not making the same mistake as the arrested members and thus by using the new ointment that prevented them to leave fingerprints behind. Similarly, the LTTE was worried about its members being captured and endangering the organization by revealing details about it, but the crisis was overcome by each member carrying the cyanide vial with them in order to avoid being captured alive.

Aum Shinrykio tried to develop for years biological agents, such as Anthrax and Ebola, but it failed and it decided to develop chemical agents instead.[90] Developing Anthrax and Ebola did not fail because of Japanese law enforcement agencies, but because they proved to be too complex for Aum to develop. Thus, the organization found itself in a crisis, because none of their Anthrax attacks delivered results. For this reason, the organization found itself between giving up to achieve its goals or to overcome the situation. Aum did overcome the situation by developing a chemical agent instead, sarin.

The characteristics of the technological innovation and of the organization itself influence whether an innovation is adopted or not and how innovation is conducted. Cost of innovation

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[90] Dolnik, Adam. p. 62

will always limit the possibilities of innovation for organizations. If an innovation will bring the expected returns and will be efficient it will be employed. Also, organizations have different tolerance degrees to risk and uncertainty, and organizations with more tolerance to these are quite likely to innovate and usually in a complex way. Complexity can be a great obstacle for an organization that uses less sophisticated weapons, but there are other organizations that have more experience and capabilities and can create sophisticated weapons. In addition, the leader/entrepreneur decides whether to innovate and shows the direction in how to innovate. The environment is important too, because it affects which terrorist organizations are more innovative and how they innovate. Besides these, goals also affect technological innovation and organizations that want to inflict many casualties when pursuing their goals are quite likely to attempt to develop highly destructive weapons. Organizations also find themselves throughout their lifetimes in crisis situations and they innovate frequently in order to overcome them.

Chapter 4: Tactical Innovation

Terrorist tactical innovation manifests itself in numerous ways. It is probably also the most diverse field where terrorist innovation occurs. Defining tactical innovation is not such an easy task. Dolnik, although talks about tactical innovation, he does not define it. Crenshaw defines tactical innovation as a change in method that usually requires new weapons or targets.[91] However, due to the fact that Crenshaw does not add technological innovation to her other three types of terrorist innovation, the definition of tactical innovation needs clarification. So, a terrorist organization is engaged in tactical innovation when it uses a new way to carry out attacks, which include attacks on new targets and the weapon used in the attack does not have to be necessarily new. The weapon used in the attacks has to be used in a new way and it also can be something other than a weapon initially, but which was transformed into a weapon. Moreover, a new way to conceal a weapon and carry an attack is also tactical innovation. Some of the tactics used by terrorists are assassination, arson, armed attack, bombing, hijacking, kidnapping, sabotage and many others. Potential targets for terrorists are government officials or buildings, abortion clinics, businesses, airlines, educational institutions, military and police, civilians, buses, utility companies and many others. Just like in the case of technological innovation, the characteristics of the tactical innovation such as cost, returns, efficiency, risk and uncertainty, complexity and factors such as leadership, environment, goals and crisis situations will influence whether and how terrorist organizations innovate.

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[91] Martha Crenshaw. p.3

The cost of the tactical innovation has a great influence on terrorist organizations' decision to innovate. An innovative tactic which is extremely cheap is beheading a kidnapped victim while capturing this on camera. Basayev and his followers in Chechnya are the pioneers of this tactic[92], which was also adopted by Musab al Zarqawi of Al Qaida in Mesopotamia and by other Al Qaida related groups such as Laskar-e-Tayyiba. The weapon used for this tactic was typically a sword or a knife and camera to capture the image. After the events were filmed, the organization usually sent the video to television stations or they posted it online on their own website. Estimating the cost of using such a tactic can be somewhere between one to five hundred dollars.

Another innovative tactic that does not involve too much cost is the suicide attack. Employing the suicide bombing tactic can cost as little as 150 dollars,[93] if one, of course, does not put a price on the life of the perpetrator himself. The low cost of this tactic made it available to many terrorist organizations. Suicide attacks became popular in the last 30 years. However, the first suicide bombing occurred in Indochina in 1951, where a communist suicide volunteer managed to assassinate the French General Chanson.[94] This was an isolated incident, because no other suicide bombing occurred until 30 years later. In 1981, Al Dawa destroyed the Iraqi embassy in Beirut (Lebanon) in a suicide truck bombing and also caused the death of 61 people.[95] What made famous this tactic were the attacks on the US and French troops by Hezbollah in 1983 because of its efficiency. Crenshaw believes that Hezbollah was inspired by

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[92] Dolnik, Adam. p. 119

[93] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 133

[94] Dolnik, Adam. p. 43

[95] Ibid. 43

Iran's "human wave attacks" in the war against Iraq.[96] Iranian volunteers (basij) had to "clear"

the field for the Iranian army by walking through mine fields and detonating them. Hezbollah is

a Shiite terrorist organization that is sponsored by Iran and besides receiving weapons from their

sponsor Hezbollah can also learn various tactics from Iran.

Another cheap tactic is concealing a weapon in a new way, in which terrorists have not

concealed it before in order to carry an attack. In August 2009 an Al Qaeda operative ("the

Trojan Bomber") almost killed Prince Mohammed Bin Nayef, the head of the Saudi national

counterterrorism organization, by hiding a pound of explosive in his rectum along with the

detonator.[97] Thus, concealing this bomb had zero costs. The security forces were totally

unprepared and unsuspecting with regards to these events. Using a simple bomb, but concealed

in an unusual way Al Qaeda proved capable of adopting a new tactic.

With regards to the social costs, the Kurdish Workers Party (PKK) carried fourteen suicide

attacks between 1996 and 1999, and most of these attacks were carried through by "long-serving

members".[98] This proved to be costly for the PKK, because they lost experienced fighters.

Moreover, their ability to carry attacks declined and after 1999 the PKK carried other types of

attacks but with a low frequency. So, this organization does not tolerate well the social costs

associated with suicide terrorism and as a consequence it is not using this tactic anymore.

Terrorist organizations will innovate tactically only if there are good returns on

investment. For example, a suicide terrorist attack usually kills four to six times more people

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[96] Martha Crenshaw. p. 8

[97] http://www.cbsnews.com/stories/2009/09/28/eveningnews/main5347847.shtml "Al Qaeda Bombers Learn from Drug Smugglers: New Technique of Storing Bomb Materials in Body Cavity Nearly Kills Saudi Prince" by Sheila MacVicar Accessed November 12, 2009.

[98] Pape, Robert A. p. 163

than other types of attacks.[99] The fact that this new tactic is so lethal and can bring high returns made it popular among many terrorist organizations, religious and secular. However, this tactic does not have to necessarily kill many people. A good return for a terrorist organization is also the assassination through suicide bombing of an important official, which would be extremely difficult to do so without using this tactic.

The LTTE was able to assassinate India's former premier Rajiv Ghandi in 1991 and Sri Lanka's President Premadasa together with 22 other people in 1993 by using suicide bombers equipped with belt bombs.[100] These targets were always followed by security, but the innovativeness of this tactic found the former prime minister's and the president's security personnel unprepared. Both targets were killed and the attacks were considered successful. Not only did the LTTE receive a lot of publicity following these events, but it was also a show of power. The LTTE demonstrated that not even the President of Sri Lanka could be safe in his own country despite being surrounded by security all the time.

Another example of returns on investment is the suicide mission conducted by 19 Al Qaeda members on September 11, 2001 against the United States. Al Qaeda used four US commercial airplanes to transform them into weapons by crashing them into the World Trade Center building, into the Pentagon and one on a field in Pennsylvania. This tactic is reminiscent of the Japanese kamikaze pilots of the World War II. Over 3,000 kamikaze pilots destroyed or damaged about 375 US navy ships, caused the deaths of more than 12,000 US sailors and

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[99] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 133

[100] Pape, Robert A. p. 139,266

wounded about 36,000 more.[101] This tactic proved extremely lethal, and besides the human loses it also produced much material damages too.

Al Qaeda planned the September 11 attacks for a few years, but its operational costs were not too high. The hijackers spent most of the money on their plane tickets, on training and on their stay in the US. The smallest amount they could have spent is a few tens of thousands and at most a few hundreds of thousands. On the other hand, the immediate damages they caused are estimated by some to be approximately $50 billion.[102] Besides the huge material damages, approximately 3,000 people lost their lives in these attacks. Al Qaeda, by using an innovative tactic, proved that with a few operatives and some moderate spending the returns can be incredibly high. Besides causing so much destruction, this organization played a role into the US' decision to enter two wars in very short time afterwards. Also, it received a lot of publicity following these events and until this day the US military was not able to put an end to this organization. The September 11 attacks on the US were the most lethal terrorist attacks perpetrated so far by a terrorist organization. Therefore, it is easy to understand why countering and defeating innovative terrorist organizations has to be the focus of law enforcement agencies and of the military. So, if a terrorist tactic is new and has the potential to bring high returns for the terrorist organization it will be employed.

A terrorist organization will also employ a new tactic if it proves to be efficient. Although the first terrorist suicide bombing attack was not directed by Hezbollah, this terrorist organization is responsible for the expansion of this new tactic among other organizations too. The suicide car bombings conducted by Hezbollah against the US and French troop barracks in

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[101] Pape, Robert A. p. 13

[102] Purpura, Philip P. p. 196

Beirut in 1983 caused the death of 241 US soldiers and 58 French soldiers.[103] The US and French soldiers were present in Lebanon on humanitarian and peacekeeping missions, but these devastating results led to the decision of withdrawal from Lebanon. Hezbollah, on the other hand perceived the US and French troops as occupiers and their withdrawal was considered a great victory. The fact that Hezbollah achieved their goal by using suicide terrorism, the withdrawal of the US and French troops, provided inspiration for other terrorist groups to use this tactic in order to achieve their own goals.

The efficiency of this new tactic is also emphasized by the statistic data available. Suicide terrorism accounted for 3 percent of all terrorist attacks between 1980 and 2003, but it was responsible for almost 50 percent of the people killed in these incidents.[104] The efficiency of suicide terrorism is also demonstrated by the fact that the person conducting the attack does not have to worry with the aftermath. He/she does not have to worry about being arrested, investigated or having to escape. By avoiding arrest and subsequently investigation by authorities, the suicide terrorist does not endanger the safety of his/her organization. The information he/she has about the organization dies at the same time with the suicide terrorist. Also, attempting to escape instead of committing suicide during the attack can increase the chances of being captured and divulging important information. Thus, protecting the other members and their respective organizations is very important for them.

Risk and uncertainty also have an impact on tactical innovation. For example suicide terrorism is one of the least risky new tactics for a terrorist organization. While the perpetrator

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[103] Pape, Robert A. p. 265

[104] Ibid. p. 6

dies in the attack, everybody else from his organization is protected. The risk to fail conducting

such an attack is very low. Once a terrorist is equipped with a belt or is ready to drive a car filled

up with explosives, he/she is practically unstoppable. The perpetrator can be stopped only if his

detonation mechanism fails. The target cannot prevent suicide terrorists from carrying out their

attacks. The Israeli leader, Yitzhak Rabin admitted in 1994 that suicide terrorism is "a form of

terrorism different from what we once knew from the PLO terrorist organization…no hermetic

solution available to protect Israeli citizens against such terrorist attacks".[105] The Israeli Defense

Forces were able to fight the PLO guerillas, but suicide terrorism is a totally different story. Also

the US and French forces were well equipped for conventional battle while in Beirut, but

preventing a suicide attack proved to be impossible. Moreover, the US airports can detect

attempts to bring bombs on board, but it was impossible to prevent a well coordinated attack

during September 11, 2001 that used the planes driven into the buildings as weapons. Therefore,

this tactic presents very low risks for the terrorist organization that uses it and also has a low

degree of uncertainty, because it is impossible to stop the suicide terrorist from creating carnage

and destroying buildings through detonation.

    There are other tactics too which present low risks. The Revolutionary Armed Forces of

Colombia (FARC) has trained horses, donkeys and dogs to deliver bombs to the intended

targets.[106] Not only that the organization will be protected and will face less risk, but this tactic

will also protect the life of individual members. However, this tactic is somewhat more uncertain

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[105]Pape, Robert A. p. 69

[106] Dolnik, Adam. p. 45

because horses, donkeys and dogs are less intelligent than human beings and the communication between the trainer and the carrier might be less straightforward.

An even more important influence on tactical innovation is complexity. Terrorist organizations tend to innovate if the complexity of the tactical innovation is not too high. For example, Riyadus-Salikhin Suicide Battalion used a new tactic against the Russian army by booby trapping enemy corpses.[107] This tactic is low in complexity, but extremely lethal. Moreover, another low complexity tactical innovation was also introduced by Hezbollah. This organization in 1990s videotaped its armed attacks against the Israeli army and then sent the videos to various media outlets.[108] The latter tactic requires slightly more complexity, because the attacks have to be successful in order for the organization to send the videos. Therefore, these attacks need more firepower to overwhelm the target. No organization wants to send a video, where it loses the battle because it creates a bad image, one of weakness.

Another new tactic that requires somewhat more complexity is taking athletes hostages at an international sporting event. Black September in 1972 took hostage the Israeli athletes present at the Munich Olympic Games, an event with about one billion people audience.[109] Five of the terrorists were shot and eleven Israeli athletes died in this incident. The German authorities were totally unprepared for dealing with such events.

Moreover, another incident with a medium level of complexity was the 1985 hijacking of the cruise ship Achille Lauro by the Palestinian Liberation Front. According to Crenshaw, this

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[107] Ibid. p. 115

[108] Martha Crenshaw. p. 3

[109] Weinberg, Leonard. 2005. Global Terrorism: A Beginner's Guide. Oxford: Oneworld, p. 30

event represented "a shift to maritime terrorist hostage seizures".[110] Until this event, most of the terrorist hostage incidents took place usually in certain buildings, on the bus or on the plane. The terrorists involved in the incident were captured in the end. Hostage incidents present more complexity than setting off a bomb, because the location of the terrorists is known to the authorities and counterterrorist organizations either attempt to save the passengers or the military can also intervene.

Another quite recent tactic is the threat of new attacks by the terrorist leaders sent via video. This a tactic favored by Al Qaeda, where its main leaders Osama Bin Laden and Al Zawahiri periodically send message threats to the US and their allies. A few years ago, Al Qaeda leadership appeared on a video threatening the European allies fighting along the US troops in Iraq and Afghanistan. In 2008, Al Zawahiri threatened again the US around elections with the message that the US will not be spared because of the new president and it advised the US population to influence the policies of their government:

"If you still want to be stubborn about America's failure in Afghanistan, then remember the fate of Bush and Pervez Musharraf, and the fate of the Soviets and British before them and be aware that the dogs of Afghanistan have found the flesh of your soldiers to be delicious, so send thousands after thousands to them…But the American people, by electing Obama, declared its anxiety and apprehension about the future towards which the policy of the likes of Bush is leading it, and so it decided to support someone calling for withdrawal from Iraq…So choose for yourself whatever you like and bear the consequences of your choice, and as you judge, you will be judged."[111]

This tactic of threatening opposing countries and their populations does not require too much complexity. It is easy to use, but on the other hand if the leader of that certain organization does

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[110] Martha Crenshaw. p. 3

[111] http://www.cnn.com/2008/US/11/19/obama.alqaeda/index.html "Al Qaeda leader mocks Obama in Web posting" Accessed on November 15, 2009.

not appear for a long time in another video message it can create the impression that he might be dead or might be in a difficult situation and tries to avoid being detected.

Another new tactic that is not too complex and that requires usually more firepower was developed and improved by Al Qaeda related groups and insurgents in Iraq and by Al Qaeda and the Taliban in Afghanistan is using multiple types of weapons against the US military vehicles. For example, a Taliban lower ranking leader explains in an interview the use of a new tactic: "We used to hit the Americans with roadside bombs and then disappear. Now when we explode an IED, we follow that with an AK and RPG."[112] This tactic became far deadlier by using several weapons against a target. After the IED shock the US military have to expect even worse and by taking AK and RPG hits too increases the likelihood that more deaths and casualties will be caused.

Complexity has affected the suicide attack tactic too. Most of the suicide attacks are not extremely complex. This new tactic can be carried out in numerous ways. Suicide bombings have a low complexity in most of the cases, because the bomber usually can be equipped with a bomb belt, can deliver the bomb on foot or by bike, by motorcycle, by car, by truck, by boat and even by scuba diving. A scuba diver bombing attack is usually more complex because it requires swimming and experience with oxygen tanks and underwater pressure. In addition, suicide missions such as September 11 require typically much more planning and are also usually more complex than suicide bombings because the perpetrators had first to take the passengers hostage and secondly and more importantly they had to know how to pilot the plane, which is not an easy skill.

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[112]Yousafzai, Sami and Ron Moreau. p. 42

The LTTE was the organization that developed the boat suicide bombing, the scuba diving bombing and the belt suicide bombing. While other terrorist organizations used mainly car and truck bombs, the LTTE diversified the tactic by finding alternative ways to employ suicide bombings. Moreover, the LTTE was capable of finding even other new tactics that were more complex than the suicide tactics and which are unique among terrorist organizations, the air raids. By using five light airplanes, the LTTE in 2007 was able to carry out bombings from these airplanes and to target two Sri Lankan military bases and to cause nine deaths.[113] Even if the LTTE had some light aircraft in carrying the air raids, this is still important because no other organization had employed this tactic so far. Al Qaeda had people able to pilot the hijacked planes, but it never used planes to bomb targets. Thus, most organizations innovate in a less complex way, but there are always other organizations such as LTTE and Al Qaeda which can innovate tactically in a more complex way.

Leadership has an important impact on tactical innovation too. The leader is important because of his decision making and because he shows the direction on how to innovate tactically. The first suicide bombing was carried out by driving a vehicle. The LTTE leader Prabhakaran came up with a suicide tactic that would require the bomber to carry the bomb on his body thus using a suicide belt after he saw the movie "Death Wish 2".[114] Prabhakaran was an innovator himself. As a decision maker and a direction setter, he indicated to his organization his willingness to develop and to use this tactic. However, Prabhakaran needed volunteers in order to

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[113] http://news.bbc.co.uk/2/hi/south_asia/6597959.stm Accessed on November 16, 2009.

[114] Martha Crenshaw. p.8

carry out this tactic and the LTTE was not lacking such people, because it became the organization with the most suicide attacks.

Another leader who influenced tactical innovation by his decision making is Osama Bin Laden. According to the 9/11 Commission Report, the "principal architect" Khalid Sheikh Mohammed proposed crashing planes into buildings in the US to Bin Laden and the latter approved it in 1998 or in 1999.[115] Khalid Sheikh Mohammed came up with the idea, but without Bin Laden's approval it would not have occurred. Bin Laden is in charge of the direction his organization has to follow. Bin Laden definitely wanted to strike the US and wanted many casualties. He favored the new tactic that it was proposed to him because it had the potential to deliver the results he expected. Ultimately, Bin Laden is the leader in charge of Al Qaeda's expenses and he decided to finance and support Khalid Sheikh Mohammed's new tactic.

Moreover, Al Qaeda's second in command, Al Zawahiri also emphasizes the direction the members of this organization should innovate on and he praises suicide terrorism: "The need to concentrate on the method of martyrdom operations as the most successful way of inflicting damage against the opponent and the least costly to the Mujahedin in terms of casualties".[116] It is clear that this new tactic, suicide terrorism is highly regarded because of its low costs and its important results it can yield. Thus, if a new tactic has the potential to cause great destruction it is quite likely that the leaders of Al Qaeda will decide to approve it.

The environment also has a great influence on terrorist organizations' tactical innovation. If the environment is hostile, and the organization faces rivals and enemies the likelihood of

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[115] Purpura, Philip P. p. 160-163

[116] Sageman, Marc. p. 23

innovating tactically is much higher. Although Hezbollah seems to have been inspired by the Iranian volunteers who were clearing the minefields for the Iranian army in the war against Iraq, the environment in which the suicide tactic occurred was quite hostile. In June 1982, Israel invaded Lebanon launching Operation Peace for Galilee in order to weaken the PLO bases in Lebanon and by August 1982 most of the PLO forces were evacuated from Lebanon.[117] In early 1980s, groups such as Amal representing the Shiites was becoming stronger and a new group Hezbollah appeared on the scene representing Shiite Muslims too, were becoming more radicalized and developed enmity towards PLO and then Israel.[118] Lebanon was and still is a country composed of a heterogeneous ethnic and religious population. The main Lebanese religious groups are: Shiites, Sunnis, Christian Maronites, Greek Orthodox Christians and Druze. These groups fought a civil war between 1975 and 1990. In addition to the hostile environment created by a civil war, Hezbollah also perceived Israeli troops, and the peacekeeping US and French troops as enemies. So, Hezbollah used the suicide bombing tactic against its enemies: Israel, US and France.

In addition to a hostile environment, terrorist organizations find "skilled" people to conduct the suicide attacks. Being a suicide bomber is not exactly a skill, but it requires sacrifice and people willing to do it are in smaller numbers than the ones who would not go through with such attacks. Due to their sacrifice on behalf of the community, martyrs are viewed as heroes and are praised. For example, Hezbollah and the society that it claims to protect are engaged in rituals and ceremonies to commemorate their martyrs, and the Liberation Tigers of Tamil Eelam

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[117] Bickerton, Ian J. and Carla Klausner. 2005. A Concise History of the Arab Israeli Conflict. Upper Saddle River: Prentice Hall, p. 215-216

[118] Ibid. p. 216

even had a "Heroes' Day" on each July 5th when they commemorated their martyrs too.[119]

Besides these, martyrs achieved immortality of their name. Many city streets received the

martyrs name, they were also mentioned on websites, in newspapers and their name and their

acts are celebrated within the community. Moreover, their videos that are left behind are

important propaganda material for terrorist organizations that distribute them widely to inspire

others in becoming martyrs and at the same time to emphasize the commitment certain

individuals took for the cause, by sacrificing their own lives. The majority of people might find

the suicide tactic as something unreasonable, but for organizations that employ it, the

environment encourages it by cultivating the idea of martyrdom.

The environment also provides new targeting opportunities. For example, abortion clinics

in the United States can be singled out from other type health care institutions. In other countries,

usually in less developed ones, the medical system is not quite diversified and abortions are

performed in the regional hospital. The United States population is also divided on the issue of

abortion, where many people oppose it and many others supports it. The US is composed of a

heterogeneous population, with many ethnicities and religions. The environment is hostile,

because pro-choice groups do not want religion or anti-abortion groups to tell them what they

can or cannot do.

In this environment, the first targeting of an abortion clinic occurred in 1976 in Oregon,

US when an anti-abortion group committed arson which caused about $19,000 in damages.[120]

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[119]Pape, Robert A. p. 188-193

[120] http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=197603000002 Accessed on November 16, 2009

Moreover, this tactic of targeting abortion clinics is overwhelmingly taking place mainly in the United States, and only very few incidents took place in other countries such as Germany and Canada. Therefore, a country that has a population which is quite divided on the abortion issue, in which religion plays an important role and where new types of targets exist will lead to innovating tactically by attacking these new targets offered by the environment.

In addition to the already mentioned characteristics of the innovations and factors that influence tactical innovation, the organizations' goals also affect how terrorists innovate. Hezbollah wanted the US and French peacekeeping troops out of Lebanon and in order to achieve the goal this organization only had to send a few suicide car bombers. The suicide truck bombings against the US and French troops in early 1980s caused too many deaths and the level of deaths tolerance of these two countries was quite low. The US and France withdrew their troops from Lebanon, because they wanted to maintain peace and not to become targets of suicide terrorism. However, the fact that Hezbollah suspected the US and French troops of aiding the Christian Lebanese made this organization to want them out of Lebanon.

Another organization that wanted the foreign troops out was Riyadus-Salikhin Suicide Battalion (RAS). Before forming RAS, Basayev and his followers in Chechnya were "the first to engage in large-scale barricade hostage taking... involving a large commando unit of suicide fighters" and in 1995 were able to take hostage 2,500 people in a hospital in Budyonnovsk, Russia in an incident that cause 166 deaths and 541 injuries.[121] Later after Basayev formed RAS, this organization conducted several similar attacks among which the most famous are the attcks on Dubrovka Theater in Moskow and the attacks on Beslan school. In October 2002, 979 people

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[121] Dolnik, Adam. p. 104

were taken hostage by 43 RAS members in Dubrovka Theater and 129 people died following this hostage situation.[122] Moreover, in September 2004 RAS commandos took hostage over 1,200 people in Beslan, which ended with the deaths of 331 people.[123] In each of these large scale hostage taking events by RAS suicide fighters, this organization asked for the Russian military withdrawal from Chechnya. RAS has not achieved the goal, but their tactical innovation was driven in search of this goal. RAS believed that Russia will not risk the deaths of so many people and especially of so many children in Beslan. However, the Russian counterterrorist forces intervened in both the Dubrovka Theater and Beslan school incident, but they did so with the cost of many lives among hostages. The RAS fighters were ready to inflict many casualties too if their demand was not achieved and they knew that the chances to get out alive otherwise were small.

On the other hand, single issue terrorists such as the anti-abortion groups in the US or the Animal Liberation Front and Earth Liberation Front tend to innovate tactically by their selection of new targets and by emphasizing low or no casualties in achieving their goals. Although occasionally, anti-abortion groups kill medical staff who work in abortion clinics, their tactics focus on less ambitious goals which are trying to influence policies by destroying property rather than use a highly lethal new tactic. However, organizations such as RAS, Hezbollah, Al Qaeda in achieving their nationalist and/or religious goals have innovated tactically in a direction that produces much human and material loses.

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[122] Ibid. p.106

[123] Ibid. p.110

Another factor that influences tactical innovation is the crisis situation. For example, the Kurdish Workers Party found itself in a crisis after the arrest of its leader Abdullah Ocalan in the beginning of 1999. According to Pape, PKK's suicide terrorism is an example of "commitment to the group's leader" and Ocalan, after being captured asked PKK members to commit suicide attacks in trying to obtain his freedom from the Turkish authorities.[124] The majority of PKK's suicide attacks occurred after Ocalan's imprisonment. PKK members wanted to release him by increasing the frequency of the suicide attacks. His organization was clearly in a crisis, because they did not know exactly what to do after his arrest. Ocalan was not only the leader of PKK, but also its founder. His followers needed to consult him on what direction to take, and the fact that this organization might still be in crisis is showed by the decline of its overall attacks in the last few years.

Another terrorist organization in crisis was Hezbollah. Hezbollah developed the new tactic of filming its attacks against the Israeli Defense Forces only after Israel decided to censor it.[125] Terrorist organizations need publicity, because through publicity they can ensure that their message is sent and that they can gain from it. By gaining publicity, a terrorist organization can also increase by adding more recruits and gaining more financial support. Being weakened by Israel's censorship, Hezbollah had to get out of this crisis by innovating tactically through filming its attacks.

Moreover, the PFLP-GC found itself into a crisis too once airline security was able to better check the mail and to detect altimeter bombs, and this terrorist organization started using

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[124] Pape, Robert A. p. 163

[125]Martha Crenshaw. p. 6

"mules".[126] This new tactical innovation, the use of mules to smuggle bombs on board of a plane was meant to overcome PFLP-GC's inability to carry attacks with altimeter bombs smuggled in mail that was typically sent to Israel. Mules were people who did not fit terrorist profiles, usually women from Western European countries, which carried their bombs unsuspectingly in their luggage. Thus, the PFLP-GC came up with a new tactic after it overcame the crisis.

So, terrorist organizations tend to innovate tactically mainly when costs of doing so are not too high, when the returns are according to what they expect, when the efficiency is high, when the risk and uncertainty associated with a new tactic tend to be low, and when the level of complexity of employing a new tactic is acceptable, meaning lower complexity for most organizations. In addition, the terrorist organization leadership will decide if and which tactic will be adopted, and the environment will provide opportunities for new targeting and if it is hostile the chances of tactical innovation are higher. Moreover, certain organization will develop new tactics to fit their goals, some organizations might stress high lethality in pursuing goals while others might use lower lethality and maybe will focus on more material damages. A crisis can also aid tactical innovation, because organizations have to overcome them somehow if they want to stay relevant.

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[126] Dolnik, Adam. p. 92

Chapter 5: Strategic Innovation

Terrorist strategic innovation is one of the least researched types of terrorist innovation. According to Crenshaw, strategic innovation implies "significant points of novelty in the historical development of campaigns of armed resistance", requires "a new goal and a new way of relating operations to that goal" and it occurs quite rarely.[127] Some examples of strategic innovation are: internationalization of terrorists' cause through diplomatic kidnapping campaigns of 1960s in Brazil and Uruguay, and hijackings in the Middle East, the "strategy of processo-guerriglia" conducted by the Red Brigades with the intention to influence the trial of several members by attacking court officials, Aum Shinrikyo's strategy of using WMDs in order to bring the apocalypse.[128] In order to internationalize their struggle, Brazilian organizations such as the Popular Revolutionary Vanguard and the Action for National Liberation and Uruguayan organizations such as the National Liberation Movement-Tupamaros kidnapped various prominent diplomats in both of these countries. With the same purpose of internationalizing their cause the Popular Front for the Liberation of Palestine began a campaign of airplanes hijacking in late 1960s and the beginning of the 1970s. While the Brazilian and Uruguayan terrorist organizations have internationalized their struggle by kidnapping foreign diplomats in Brazil and in Uruguay, the PFLP internationalized their struggle by hijacking airplanes in Europe and not in their main theater of operations, Israel. The Red Brigades in Italy and Aum Shinrikyo in Japan also came up with new strategies which allowed them to pursue new goals. For the Italian Red

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[127] Martha Crenshaw. p. 2

[128] Ibid. p. 2-3

Brigades, the new goal became freeing the captured members, while Aum wanted to demonstrate that the coming of the apocalypse is imminent.

The economic and social costs have influenced terrorist strategic innovation. The economic costs of diplomatic kidnappings were quite minimal. The Action for National Liberation (ALN), the Popular Revolutionary Vanguard (VPR), and the National Liberation Movement-Tupamaros had to spend money for the weapons used in their attacks, which were mainly firearms, and for holding the kidnapped diplomats in a safe house. Firearms are inexpensive and holding a kidnapped victim is inexpensive too. Perhaps one is inclined to believe that these organizations spent most of the budget to carrying out this type of operations on feeding the kidnapped person. However, most of the kidnapped diplomats were released within a few days. For example, the US ambassador to Brazil, Charles Burke Elbrick was released after three days and the West German ambassador was released after a week by the ALN; but the British ambassador Geoffrey Jackson was released by the Tupamaros after a longer period of eight months.[129] Thus, the costs associated with holding a kidnapped diplomat were minimal in most cases and they were still small even in the case of the British ambassador, because most costs came from feeding the person and keeping him alive.

Besides economic costs, social costs can affect strategic innovation too. For example, after the Popular Front for the Liberation of Palestine (PFLP) stopped the hijacking of airplanes, Wadi Haddad, the man behind the idea of hijackings to gain international attention for the Palestinian

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[129] Crenshaw, Martha and John Pimlott. p. 425,452

cause who was also the Special Operations head of this organizations defected in 1972.[130] However, this did not bring the end of the PFLP, but it did cost the organization the loss of an important member.

Strategic innovations are adopted when they bring a high yield on investment for terrorist organizations. In return for the release of the US ambassador Charles Burke Elbrick in September 1969, the ALN obtained the release of 15 political prisoners who were also embarked on a plane to Cuba; for the release of the West German ambassador in June 1970, ALN obtained the release of 40 other prisoners; and for the release of the Swiss ambassador, the Popular Revolutionary Vanguard (VPR) obtained the release of 70 prisoners.[131] These were immediate returns on investment and it is quite obvious that kidnapping diplomats provided the terrorist organization with the upper hand in the negotiation with the authorities. The Brazilian authorities were embarrassed for not being able to protect important officials representing very powerful countries.

In addition to the immediate returns, these terrorist organizations were able to internationalize their struggle through the publicity received following the kidnapping of diplomats. The headline news about the kidnappings of the US, the West German, and the Swiss ambassadors influenced the public opinion in these countries which in turn can pressure their own government to ensure the release of their diplomats by pressuring further the country that has to deal with the terrorists, which in this case was Brazil. Brazil did not have a better alternative than losing in the negotiations with the ALN and the VPR, because risking the death

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[130] Martha Crenshaw. p. 9

[131] Crenshaw, Martha and John Pimlott. p. 423-425

of these diplomats can bring even higher loses, such as each of these respective countries to withdraw their diplomatic staff from Brazil because of the lack of safety in this country.

The strategic terrorist innovations of kidnapping diplomats in Latin America and hijacking airplanes in Europe by Middle Eastern organizations in order to internationalize their struggles were efficient because they were able to accomplish what they had hoped for, international publicity. So, besides looking at the costs of a new strategy and at the returns on investments, one needs to consider also whether the new strategy is efficient. If a new strategy is efficient, the likelihood of a terrorist organization to employ it is much higher.

With regards to the PFLP and other organizations that started to use hijacking for internationalization of the Palestinian cause, one realizes that this strategy was efficient also from what a high ranking PLO member had to say about it. This high ranking official was Zehdi Labib Terzi, who represented the PLO at the UN and who said that "the first several hijackings aroused the consciousness of the world and awakened the media and world opinion much more…than 20 years of pleading at the United Nations."[132] The efficiency of this strategy is obvious. It was able to draw the world's attention to the Palestinian cause, something that was impossible to be accomplished in two decades of pleadings in the most prestigious international body, the United Nations. Therefore, this new strategy is highly regarded among the people who started employing it and among all the others who had to benefit from it.

Moreover, even George Habash, the leader of the PFLP recognizes the efficiency of using this new strategy. For Habash hijacking airplanes in Europe to gain publicity for the Palestinian

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[132] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 64

struggle was extremely important: "when we hijack a plane it has more effect than if we kill a hundred Israelis in battle…For decades world opinion was neither for us nor against us. It simply ignored us. At least the world is talking about us now."[133] Habash emphasizes the fact that this new strategy is more important even than killing a large number of enemies. The new strategy does not even require the death of any of the passengers in order to be efficient, because it automatically brings the terrorist organization using it a lot of publicity on the international arena.

Typically, international flights tend to have people from several countries on a plane which try to reach a destination in another country for business, family visits, or tourism. Although most of the hijacked airplanes were part of El Al, the Israeli Airlines, they had not only Israelis on board but also many Europeans and sometimes Americans. This in turn, corroborated with the fact that these planes were hijacked after they took off in European airports guaranteed the PFLP worldwide publicity for their acts and for their cause. Thus, this new strategy was adopted because it was efficient by capturing the world's attention.

Moreover, when a new strategy presents less risk and uncertainty it is more likely that a terrorist organization will use it. The PFLP realized that once the members of the group were able to smuggle weapons on board, the degree of risk and uncertainty will be low. In order to minimize the risk and the uncertainty with carrying out airplane hijackings in order to gain international attention for their cause, the PFLP had to find "terrorist safe" countries where landing the hijacked airplanes could also guarantee them their own freedom. For example, in July 1968, three PFLP members hijacked an El Al airplane and forced it to land in Algiers

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[133] Ibid. p. 66

(Algeria) and on August 1969, Leila Khaled trained by the PFLP diverted a TWA plane from Rome to Damascus (Syria).[134] Once the airplanes took off, counterterrorist organizations could not storm the planes in order to ensure the release of the passengers. These airplanes also landed in Algeria and in Syria, which are countries sympathetic to the Palestinian cause. So, they had no intentions of storming the planes once in their airports or allowing other foreign counterterrorist organizations to do so. The Algerian and Syrian regimes acted as negotiators and all the PFLP members who participated in these two incidents were ensured their freedom.

Moreover, the operations of diplomat kidnappings in Brazil in order to internationalize Popular Revolutionary Vanguard's (VPR's) and Action for National Liberation's (ALN's) struggle required low risk and low uncertainty too. The VPR and the ALN were able to secure each time a release of some members from prison in exchange for the freedom of the US ambassador, the West German ambassador, and the Swiss ambassador. The risk associated with kidnapping these diplomats was quite low, especially that they were not hold for a long period. Once the diplomats were captured and locked in a VPR or ALN safe house, they just had to wait until the Brazilian authorities gave in to their requests. The fact that the Brazilian authorities gave in each time to these requests also emphasizes the low level of uncertainty for these organizations. The VPR and ALN obtained the release of several members from prison, and just like the PFLP they gained worldwide publicity for their struggle.

Complexity influences terrorist strategic innovation too. Typically, if a strategic innovation is less complex then it has more chances to be adopted. Aviation security in the 1960s was frequently unprepared for hijacking events, especially due to the fact that the airport

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[134] Crenshaw, Martha and John Pimlott. p. 298-299

technology was not able to detect the weapons. Even so, the PFLP's hardest task in carrying

hijackings was smuggling the firearms and grenades on board. Once the weapons were brought

on board by PFLP members, the incentives for the unarmed passengers and flight crew was to

comply especially that the PFLP was interested in gaining international attention and not to kill

the passengers. In order to ensure compliance, this organization just had to point the firearm

towards the passengers or to make it clear that they have a grenade with them. Moreover, by

choosing safe landing sites the PFLP ensured that their operations do not need too much

sophistication in order to be carried out.

In addition, the Red Brigades' strategy of trial guerilla in the 1970s was not requiring too

much complexity either. After the arrest of numerous Red Brigades members including some

high ranking ones, the other members only had to identify who the judges were and when to

assassinate them. In June 1976, the Red Brigades assassinated the judge Francesco Coco,

threatened the lawyers of Turin trial, murdered the President of the Lawyers' Association Fulvio

Croce in 1977, in 1978 the judge Riccardo Palma was shot dead and the same year one of

Turin's police chief's was killed too.[135] All these operations required low sophistication. Once

the target was identified, usually a judge, a policeman or a lawyer, the Red Brigades

concentrated their efforts in eliminating them. They used mainly firearms, which are not too hard

to handle and the only thing they had to worry after killing the targets was to escape safely. In

this way, the Red Brigades was able to disrupt the trial of their fellow members by assassinating

and intimidating court officials involved in the trial.

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[135] Crenshaw, Martha and John Pimlott. p. 561-562

On the other hand, organizations such as Aum Shinrikyo used a much more complex strategy. Aum wanted to bring about the apocalypse by using weapons of mass destruction. The fact that it employed a very complex strategy made them fall far short from reaching their goal. Even if Aum's subway attacks would have killed all the people affected in the attacks, including the injured, their strategy of bringing the apocalypse would still be far away from being reachable. Only countries such as the US and Russia have a capability of bringing something close to an apocalypse due to their buildup of WMDs during the cold war. The US has about 4,000 operational nuclear warheads and Russia has approximately 5,000 of them.[136] However, most terrorist organizations innovate strategically in a less complex way. PFLP's hijacking and VPR's and ALN's kidnappings for internationalization of their struggle are low complexity strategies. The Red Brigades trial guerilla strategy to disrupt the trial of their members by assassinating court officials presented a low complexity too. Therefore, low complexity strategies are more likely to be employed and are usually more successful.

Another factor which affects terrorist strategic innovation is leadership. According to Crenshaw, "hijackings were the brainchild of Wadi Haddad,"[137] which was second in command in the PFLP after George Habash. Wadi Haddad is the one who came up with the idea of using hijackings in order to internationalize the Palestinian cause and George Habash is the one who supported him in implementing this idea. Haddad emphasized the importance of employing this new strategy: by the need of PFLP to hit the Israelis in a "qualitative, not quantitative way…We

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[136] http://www.nti.org/db/disarmament/stockpile_chart.html Accessed on November 22, 2009.

[137] Martha Crenshaw. p. 9

have to hit the Israelis at the weak points. I mean spectacular, one-off operations."[138] Hijacking airplanes is the qualitative operation Haddad talks about and it represents a weak point for Israel because it involves the lives of innocent people who risk death in case their government does not cooperate with the demands of PFLP. Haddad was part of PFLP leadership and he was also the innovator with regards to the strategy. He also assured Habash's acceptance in using the new strategy.

Leadership played an important role in the diplomatic kidnappings in Brazil and Uruguay. The ALN leader Carlos Marighella and the Tupamaros leader Raul Sendic Antonaccio were the uncontested leaders of their each organization respectively. They both decided to adopt the strategy of diplomatic kidnappings to internationalize their struggles. These leaders realized that this strategy not only helped them release many of their fellow members in these organizations from prison, but also brought them international attention. Moreover, another leader with great influence on a new strategy was Shoko Asahara. He knew that only by using WMDs could his organization gain some credibility to supporting the idea that the apocalypse was imminent. Therefore, Shoko Asahara concentrated much of the funds on using a strategy involving chemical weapons with high capability of taking human lives only to show that he was right in preaching about the coming of the apocalypse.

The environment is another factor that influences strategic terrorist innovation. PFLP was present in a hostile environment with many rivals and with enemies. Some of PFLPs rivals were Al-Fatah, the Democratic Front for the Liberation of Palestine (DFLP), the Popular Front for the Liberation of Palestine-General Command (PFLP-GC), while the enemies were the Israelis. The

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[138] Crenshaw, Martha and John Pimlott. p. 298

PFLP and Al Fatah were the largest members of the PLO. The PFLP had a Greek Orthodox Christian as a leader, George Habash, while Al Fatah had a Muslim leader, Yasser Arafat. PFLP was initially more radical than Al Fatah due to its emphasis on spectacular operations. Moreover, the religious difference from their enemies was obvious too because the Israelis belonged to the Mosaic religion. Ethnically too the Israelis are different from the Palestinians.

The rivalry for supremacy among the Palestinian organizations continued over the years. The PFLP was leading the "Rejection Front" in the 1970s which opposed any deals with Israel, unlike Arafat who was willing to strike a deal.[139] The other two rivals, the DFLP and the PFLP-GC are organizations that splintered from the PFLP. The DFLP wanted to emphasize more Marxist-Leninist ideology, as opposed to PFLP that emphasized Palestinian nationalism.[140] The PFLP-GC wanted more action and its leader, Jibril, considered "hijackings…worthy only of people too weak to actually pull the trigger."[141] Thus, the PFLP had several rivals for different reasons. The PFLP rejected the idea of reaching a settlement with their enemy, Israel. This together with the fact that the PFLP emphasized spectacular actions made Al Fatah look more moderate that the PFLF. In addition to this, the DFLP splinter group diverged on the ideology emphasis with the PFLP. On the other hand, the PFLP-GC was even more radical than the PFLP itself. Unlike the PFLP, the PFLP-GC wanted the airplanes' passengers to die in their attacks. The PFLP wanted to gain the international public's attention, the PFLP-GC wanted to tell this public to be prepared to die in an airplane targeted by PFLP-GC. Each of these rivals sought to

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[139] Crenshaw, Martha and John Pimlott. p.309

[140] http://www.start.umd.edu/start/data/tops/terrorist_organization_profile.asp?id=39 Accessed on November 22, 2009.

[141] Dolnik, Adam. p. 82

show that they could represent the Palestinian cause better than the other. They all fought harder to show why they should take the lead in the struggle. Thus, PFLP's environment was hostile. It contained numerous rivals, enemies and also a heterogeneous ethnic and religious population. A hostile environment is more likely to lead to strategic terrorist innovation.

Goals have affected terrorist strategic innovation too. The PFLP, the ALN, and the VPR by trying to internationalize their struggle through hijackings of airplanes in Europe by the PFLP and by kidnapping diplomats by the latter two were able to innovate in a less lethal way. They only wanted to draw the world's attention with their actions and they were able to do so. These organizations had the opportunity to kill these targets, but their objective to gain international attention restrained them in doing so. Spilling too much blood of innocent people was not in their plans to carry out these operations.

On the other hand, Aum Shinrikyo had the goal to bring about the apocalypse. This organization showed its desire to destroy numerous lives by using WMDs such as sarin gas, but fortunately for the targets the weapons used in the attacks were inefficient and only twelve people have died following Aum's Tokyo subway attacks. Therefore, the goals an organization pursues affect how and whether it will innovate strategically. The PFLP, the ALN, and the VPR gained the worldwide public's attention without emphasizing lethality, while Aum's goals could have been tried to be achieved only through an emphasis on high lethality.

Terrorist strategic innovation is also influenced by the crisis these organizations are facing. The two main leaders of the Red Brigades, Renato Curcio, and Alberto Franceschini were

arrested in 1974 and in 1976[142] and along with about 50 other members they were brought to trial in 1976.[143] The arrest of these leaders and of a large number of Red Brigades members plunged the organization into a crisis. In order to overcome this crisis, the Red Brigades members who were not in prison innovated strategically by pursuing new goals, the freedom of their leaders, and the obstruction of their trial. To achieve their goals, the Red Brigades started a campaign of assassination and intimidation of all the high ranking officials involved in the trial, a campaign also known as trial guerilla. The organization did not focus on leftist goals anymore, but it switched to goals that would ensure the survival of the organization. Therefore, the Red Brigades employed a new strategy in order to try to overcome the crisis.

Another organization, the PFLP was born out of a crisis. The PFLP traces its origins to the Arab Nationalist Movement, which carried out cross-border raids for years against Israel in order to provoke a war between Israel and its Arab neighboring countries.[144] The Arab Nationalist Movement had hoped that this strategy would bring the defeat of Israel and the formation of Palestine. However, in June, within six days, Israel defeated the Egyptian, Syrian, and Jordanian armies and conquered Gaza, Sinai, the West Bank, and the Golan Heights. Thus, this strategy has backfired against the Arab Nationalist Movement. In 1967, the PFLP was formed under the leadership of George Habash, who realized that the Palestinian organizations fighting for a Palestinian state found themselves in a great crisis, since not even the armies of the Egyptians, the Syrians, and the Jordanians could defeat Israel in 1967. Habash and Haddad knew that to

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[142] Crenshaw, Martha and John Pimlott. p. 561

[143] Martha Crenshaw. p. 2

[144] Crenshaw, Martha and John Pimlott. p. 298

overcome the crisis this organization had to come up with a new strategy. That strategy was the internationalization of the Palestinian cause through hijacking of airplanes in Europe.

Furthermore, Aum Shinrikyo went through a crisis too. In February 1990, Shoko Asahara and a few other members were hoping to be elected in the Japanese Diet, but they suffered a terrible defeat and when members started to leave the organization Asahara was faced with closing down the organization or regaining control.[145] Aum's began researching chemical and biological weapons in April 1990.[146] Once his previous strategy of gaining power through the political process did not work, Asahara chose to regain control over the organization and to come up with the new strategy of bringing on the apocalypse by using WMDs. Aum was in a crisis after its main members lost the elections. In order to overcome this crisis and to strengthen the organization, Asahara laid down for the organization a new strategy. Therefore, organizations that go through various crises during their existence are very likely to innovate in order to survive and to overcome the crises.

Thus, terrorist strategic innovation tends to occur mainly when the new employed strategy has the potential to be inexpensive, yields a high return, is efficient, presents low risks, and a low degree of uncertainty, and it is not too complex. Moreover, the leader decides whether and how the organization should employ a new strategy. The hostile environment tends to influence strategic innovation much more than a friendly one. Also, a new strategy is affected by the new goals because it will be carried out in order to achieve them. The crisis situations tend to lead to a new strategy because the organization looks for a way to overcome this difficulty.

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[145] Martha Crenshaw. p. 5

[146] Ibid. p.4-5

Chapter 6: Organizational Innovation

Terrorist organizational innovation has also been scarcely researched. Martha Crenshaw provides a useful definition of organizational innovation, which according to her "involves changes in group structure and institutions."[147] Certain terrorist organizations change their structure and their institutions in order to survive. Organizational innovation, just like strategic innovation appears quite rarely. However, there are some examples of organizational innovation: the Tupamaros "compartmentalized underground structure of urban guerilla in the 1960s," the IRA's "small, centralized... cellular" structure in the middle of 1970s, the Anti-Imperialist Front of West European Guerillas created by the Red Army Faction in the 1980s, and the adoption of a "diffuse transnational network" by Al Qaeda.[148] Moreover, Hoffman mentions the Earth Liberation Front (ELF) of being a "leaderless network,"[149] but he does not mention the terms organizational innovation in his research. The ELF as a "leaderless network" can qualify as an organizational innovation too. Another leaderless network is the Animal Liberation Front (ALF), which shares somewhat similar goals and ideology with the ELF. The concept of "leaderless resistance" was first developed by Louis Beam of the Ku Klux Klan. Beam encouraged fellow right-wing extremists to take action even without a leader.

Furthermore, the structure and the institutions of an organization can be influenced by the Internet too. Weinberg emphasizes Al Qaeda's leading role in recruiting through the Internet

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[147] Martha Crenshaw. p. 3

[148] Ibid. p. 3-4

[149] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 38

after the September 11, 2001 attacks.[150] Al Qaeda received a huge blow from the US intervention

in Afghanistan and it was forced to disperse many of its members in various other parts of the

world, especially in Pakistan. Through the Internet, Al Qaeda was able to gain more recruits and

especially was able to inspire others to commit attacks on its behalf. In addition, Al Qaeda also

developed a system of giving "seed money" to various individuals, who in turn had to raise more

money through all kind of means, typically illegal ones, and to gain more recruits on their own to

carry out attacks.

Organizational innovation is also influenced by the characteristics of the innovation: costs,

returns on investments, efficiency, risk and uncertainty, complexity and by factors such as

leadership, environment, goals, and crisis situations. With regards to the costs, an organization

will favor a new structure and institutions only if the shift is not too costly. Al Qaeda's new, less

hierarchical and decentralized structure proved to be a low economic cost organizational

innovation. According to Sageman, Al Qaeda in the 1990s became an organization composed of

"clusters of terrorists" with "very few full-time paid staff members of Al Qaeda."[151] Al Qaeda,

by having fewer members on their payroll was able to reduce the costs.

Moreover, Al Qaeda instead of participating directly in terrorist attacks it preferred to train

potential terrorists in Afghanistan, to fund them with some "seed money to get the ball rolling"

and to support them logistically.[152] By providing seed money for various attacks, Al Qaeda did

not have to micromanage each terrorist act. A good example of an individual who went through

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[150] Weinberg, Leonard. 2008. Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate. p. 15 Accessed on May 12, 2009 at http://www.terrorismanalysts.com/pt/index.php?option=com_rokzine&view=article&id=58

[151] Sageman, Marc. p. 38

[152] Ibid. p. 48

such an experience is Ahmed Ressam, who was involved in a plot to set off a bomb in the Los Angeles airport. This individual went through an explosive training in Afghanistan, received $12,000 to organize the bombing of the Los Angeles Airport, raised additional funds from friends and supporters, received logistical support in Canada, but he was captured in December 1999 when trying to cross the border in the US with the materials needed for making a bomb.[153] Thus, Al Qaeda by becoming a decentralized organization limited its costs to sustain itself. Any individual that shared its goals and had the potential to carry attacks against the West received Al Qaeda's support without the requirement of that certain person to be a longtime member.

With regards to social costs, the leadership of Al Qaeda loses some of its power because of the decentralized structure and the less hierarchy of this organization. Due to adopting such a structure and implicitly allowing more autonomy for various attacks, Al Qaeda increases the power of the individuals who perpetrate the attacks. However, Al Qaeda leadership agrees with this loss of power on their side, but realizes that the organization is much better adapted to survive for a longer period if it keeps a decentralized structure.

A terrorist organizational innovation is also adopted when the new structure can promise high returns on investment. The ELF, being a "leaderless network" can produce great material damages through its actions and can gain a lot of publicity as well. The ELF has a few websites which are usually run by ELF press officers or by sympathizers. These websites are presenting the ELF ideology, its history, and many of the attacks that this organization took part in. According to Hoffman, one of ELF's press officers, Craig Rosebraugh explains how recruitment goes about in the ELF: "individuals interested in becoming active in the Earth Liberation Front to …form your own close-knit autonomous cells made of trustworthy and sincere people.

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[153] Ibid. p. 103

Remember, the ELF and each cell within it are anonymous not only to one another but to the general public."[154] By forming autonomous cells, the ELF members do not have to invest too much in their activities and in supporting the cell. Each cell is self supporting. The majority of the ELF's attacks are arsons and so far this group has not killed any person. Arsons are among the cheapest terrorist methods that can potentially be perpetrated. Due to the fact that the preferred ELF attack method is arson and that each cell is self supporting, the ELF members invest very little.

On the other hand, the ELF causes great material damages to companies and agencies that are perceived to do a great damage to planet Earth. So far, the damages caused by ELF are estimated to be around $150 million.[155] One of ELF's cells set fire to Vail Ski Resort in Colorado causing one of their most destructive attacks with a damage of $12 million dollars.[156] This attack required only a few people and a simple weapon, fire. Thus, the ELF's new structure, composed of autonomous cells has enabled this organization to obtain high returns on its investments. It was able to cause a lot of destruction, but also to gain publicity following its actions.

In addition to costs and returns, organizational innovation is also influenced by efficiency. For example, the use of Internet for recruitment is a good example of efficiency. Younis Tsouli, a Moroccan living in London, set up an online network which helped Al Qaeda transfer large files and set up a system of recruitment online after the US intervention in Afghanistan.[157] Even

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[154] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 38

[155] http://www.elfpressoffice.org/   Accessed on November 27, 2009.

[156] http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=199810190001 Accessed on November 27, 2009.

[157] "Terrorists Take Recruitment Efforts Online: Scott Pelley on the Use of the Internet to recruit Jihadists" by Schorn, Daniel p.2 Accessed on November 27, 2009 at

after Tsouli was arrested by the British authorities in 2005, "his network is still pulling recruits into jihad."[158] Through the Internet and Younis' network, recruits from various parts of the world had the opportunity to find out useful information on how and why they should join Al Qaeda. Al Qaeda was in a difficult situation after the US intervention in Afghanistan and after being on the run it realized the power of the Internet in aiding the organization's recruitment efforts.

Moreover, another aspect of Al Qaeda's organizational innovation is its power to inspire individuals to commit terror acts on its behalf. Some examples of attacks that proved the efficiency of inspiration are the 2004 Madrid train bombings and the 2005 London bombings. The Madrid train bombings were perpetrated by a cell of Muslims living in Spain, who inspired by Al Qaeda's goals and ideology caused the death of 191 people and injured 1,800 people.[159] Not only that these individuals caused so much life destruction, but they were also able to affect the Spanish elections, because the bombing took place only a few days before the elections. The Conservative Jose Maria Aznar who was responsible for sending troops to Iraq lost to the representative of the Socialists Jose Zapatero who promised withdrawing the Spanish troops from Iraq.

In a similar way four British Muslims, in July 2005 wanted to pressure the British government to withdraw their troops from Iraq. Although the British government did not withdraw the troops, the London underground train bombings along with a double-decker bus bombing were still able to cause the death of over 50 people. Thus, both the Madrid cell and the

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http://www.cbsnews.com/stories/2007/03/02/60minutes/main2531546_page2.shtml?tag=contentMain;contentBody

[158] Ibid. p.2

[159] "The worst Islamist attack in European history" Accessed on November 27, 2009 at http://www.guardian.co.uk/world/2007/oct/31/spain

London cell proved that inspiration works. In 2004, Al Qaeda in Saudi Arabia in an online publication encourages and tries to inspire individuals to commit terrorist acts in their own countries "in order to join the great training camps you don't have to travel to other lands. Alone, in your home or with a group of your brothers, you too can begin to execute the training program."[160] The London and Madrid cells did exactly so. They built a cell of close friends in the countries they were living in and carried there the terrorist attacks. Thus, these two cells show how efficient inspiration can be in creating one's own cell.

Risk and uncertainty also influence whether and how terrorist organizational innovation will occur. Al Qaeda's and ELF's new structures imply a low degree of risk and a low degree of uncertainty. ELF's "leaderless network" is formed of autonomous cells. Each cell is formed by individuals who know each other: they are either friends or relatives. The level of trust among the cell members is high, because the likelihood of being turned in to the authorities by a relative or a close friend is very low. Moreover, the fact that the cells are autonomous and that a certain cell does not know who is a member in another ELF cell reduces the risk for the organization. If a certain ELF cell is arrested, its members will not be able to cooperate with the authorities in giving additional names of other people involved because the cell has information only about its own members and not about members from other cells. In this way, the ELF is protected and if the members of a cell are arrested all the other cells can carry their operations as usual without being affected. Thus, the ELF's "leaderless network" is adapted very well to survive for a longer period. Its new structure involves a low degree of risk and a low degree of uncertainty.

Furthermore, Al Qaeda's new structure was adopted because it involves less risk and less uncertainty too. According to Sageman "unlike a hierarchical network that can be eliminated

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[160] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 218

through decapitation of its leadership, a small-world network resists fragmentation because of its dense interconnectivity."[161]A small-world network is composed of nodes and hubs, the latter being more connected.[162] Al Qaeda with its small-world network has better chances to survive than if it would be organized in a strict hierarchical way. A few decades ago, terrorist organizations were typically organized in a hierarchical way, but they were being exposed to higher risks too because of it. Once a hierarchical organization loses its leadership, it is almost certain that it will die soon too. However, Al Qaeda by being an interconnected network will still be able to survive in the eventuality of leadership decapitation. So, by adopting a decentralized and a less hierarchical structure, Al Qaeda reduced the level of risk and uncertainty.

Furthermore, similarly to the ELF, friendship played an important role for Al Qaeda members and for the organization in reducing the level of risk and uncertainty. According to Sageman, friendship bonds account for 68 percent of the Al Qaeda members who joined the organization, while kinship accounts for 14 percent and discipleship for 8 percent.[163] Due to the fact that most of the Al Qaeda members are close friends or are joining the organization through family connections, it is really hard for counterterrorist organizations, for the military, and for the authorities in general to dismantle this organization. Friends and family members are not very likely to turn in Al Qaeda members. Thus, by having such a high percentage of friendship and kinship bonds in an organization, the level of risk and uncertainty will decrease.

Complexity affects terrorist organizational innovation too. According to Hall, complexity has three elements: horizontal differentiation, vertical differentiation, and geographical

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[161] Sageman, Marc. p. 140

[162] Ibid. 137

[163] Ibid. p. 111-113

dispersion.[164] Horizontal differentiation is reflected in the division of labor, vertical or hierarchical differentiation is reflected in the number of levels, and geographical dispersion is reflected in the number of locations the organization has operations; so, an organization with a high division of labor, with numerous levels in the hierarchy, and with many operation locations is complex.[165] In order to assess terrorist organizations' level of complexity, one needs to consider the three elements of complexity.

With regards to horizontal differentiation, the ELF has a low division of labor. Considering the fact that the ELF's preferred method of attack is arson and to a lesser degree destroying construction machinery, the division of labor required for this is quite low. Setting up fire to a suburban development for example can be done by a few individuals who just have to use some gasoline and a torch. It is extremely easy to accomplish with a low diversification. One person can place the gasoline on or in a building while another can throw the torch. Moreover, with regards to the vertical differentiation, the ELF has a very low hierarchy or maybe really no hierarchy. The individual who is responsible for initiating formation of an ELF cell might act as a leader or they might decide with equal amount of power on what and how to act. Also, an ELF press officer might be taken as some kind of a leader, but who does not have direct involvement. Thus, the ELF can have about one to three levels in the hierarchy. With regards to geographical dispersion, the ELF has bases in UK, US, and Canada. The geographical dispersion reflects some complexity, but overall when one looks at all three levels it is obvious that the ELF represents an organization with low complexity.

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[164] Hall, Richard. p.52

[165] Ibid.

Al Qaeda, on the other hand, is more complex than the ELF, but it is not a very complex organization. For example, in carrying the September 11, 2001 attacks Al Qaeda had 19 people on four planes. The 15 Saudis represented the "muscle" that helped to take over the planes,[166] while the other four were the pilots of the planes. Besides them, Khalid Sheikh Mohammed was the planner of the operation. Thus, the division of labor was quite simple: planner, pilots, and "muscle." To these, one might also add Bin Laden as a financial supporter and main leader of the organization. Overall, the organization can present somewhat more complexity because it can have fighters, suicide bombers, trainers, financial supporters, but when carrying attacks, the division of labor is quite low.

Moreover, with regards to vertical differentiation, Al Qaeda represents a low level of hierarchical differentiation. It has very few hierarchical levels. Sageman identifies four main clusters: the Central Staff, the Core Arab, the Maghreb Arab, and the Southeast Asian which are built around "hubs" such as Bin Laden, Khalid Sheikh Mohammed, Abu Zubaydah, and Abu Bakar Baasyr.[167] The hierarchy continues downward from the aforementioned "hubs" to a lieutenant in the field, which is usually connected to an operational commander, such as Atta in the case of 9/11.[168] Thus, Al Qaeda has around four hierarchy levels. This shows that the vertical differentiation element is not so complex because it does not have many hierarchical levels.

The geographical dispersion of the Al Qaeda is a totally different matter. This organization has over 40 bases of operations among which the National Consortium for the Study of Terrorism and Responses to Terrorism identifies: Afghanistan, Albania, Algeria, Australia,

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[166] Sageman, Marc. p. 107

[167] Ibid. p. 137-138

[168] Ibid. p. 138

Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Bosnia, Egypt, Eritrea, France, FRY (Kosovo), Germany, India, Iran, Ireland, Italy, Jordan, Kenya, Lebanon, Libya, Malaysia, Mauritania, Netherlands, Pakistan, Philippines, Qatar, Russia, Saudi Arabia, Somalia, South Africa, Sudan, Switzerland, Tajikistan, Tanzania, Tunisia, Turkey, Uganda, United Arab Emirates, United Kingdom, United States, Uzbekistan, Yemen.[169] So, according to the dispersion element, Al Qaeda can be considered a complex organization. However, when one considers the other two elements of complexity: horizontal differentiation and vertical differentiation, drawing a conclusion only on one element would not be accurate. Al Qaeda is complex because of its geographical dispersion of operations bases, but it is quite simple when one analyses its horizontal and vertical differentiation.

In addition to the characteristics of the organizational innovation, leadership can play an important role on how terrorist organizations innovate. Osama Bin Laden and Ayman al Zawahiri influenced how Al Qaeda innovated organizationally. According to Sageman, Al Qaeda's "horizontal fluid structure" was also due to the fact that this organization's leadership was not authoritarian: "authoritarianism is contrary to the tenets of Salafism, which preaches that only God is superior to men."[170] Thus, Al Qaeda's leadership had an important role in allowing the organization to be less hierarchical and to be decentralized. Furthermore, Sageman mentions that Bin Laden allowed "the global Salafi jihad network to evolve spontaneously and naturally…The system developed into a small-world network…"[171] Osama Bin Laden was

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[169] http://www.start.umd.edu/start/data/tops/terrorist_organization_profile.asp?id=6   Accessed on November 28, 2009.

[170] Sageman, Marc. p. 90

[171] Sageman, Marc. p. 172

instrumental as a decision maker in the evolution of the organization. He preferred to relinquish much of his initial power only to see Al Qaeda survive and expand.

Bin Laden was also able to influence other aspects of the structure too. For example, when Abu Sayyaf Group became more of a criminal group than a terrorist one, Bin Laden cut its links with it and decided to support Moro Islamic Liberation Front instead in Philippines.[172] When an Al Qaeda associate group digressed from the Jihadist goals, Bin Laden decided to affect the structure by cutting its link with that group. Therefore, the leader usually through financial support can create links and this way increase the organization in size or can cut links and in those circumstances decrease the size of an organization.

Another member of Al Qaeda leadership, Ayman al Zawahiri, the second in command, tries to convince potential Al Qaeda inspired individuals through his book "Knights Under the Prophet's Banner" to form their own cells and to commit attacks against the West:

"Tracking down Americans and Jews is not impossible. Killing them with a single bullet, a stab, or a device made up of a popular mix of explosives or hitting them with an iron rod is not impossible. Burning down their property with Molotov cocktails is not difficult. With the available means, small groups could prove to be a frightening horror for the Americans and the Jews."[173]

The emphasis is on killing Americans and Jews by creating terrorist cells. Zawahiri provides the direction in which organizational innovation to develop. He realizes that terrorist cells that form on their own initiative and can carry attacks against the US serve quite well Al Qaeda. Thus under Bin Laden's and Zawahiri's leadership Al Qaeda was able to adopt a new structure, which is decentralized and has a low hierarchy.

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[172] Ibid. p. 44, 64, 151

[173] Hoffman, Bruce. 2006. Inside Terrorism. New York: Columbia University Press, p. 38-39

More recently a debate over Al Qaeda's leadership has ensued in Foreign Affairs between two terrorism scholars Bruce Hoffman and Marc Sageman. On one hand, Hoffman in "The Myth of Grass-Roots Terrorism: Why Osama bin Laden Still Matters?" accuses Sageman that he minimizes the role of Al Qaeda's leadership in his new book "Leaderless Jihad." On the other hand, Sageman responds through "Does Osama Still Call the Shots? Debating the Containment of Al Qaeda's Leadership" that "Al Qaeda Central is of course not dead, but it is contained operationally…"[174] Moreover, Hoffman maintains that "Al Qaida is a remarkably agile and flexible organization that exercises both top-down and bottom-up planning and operational capabilities."[175] Al Qaeda leadership does matter, but it does not micromanage every attack. Terrorist attacks with high potential tend to have some Al Qaeda Central involvement, while other much smaller type of attacks can be carried out autonomously by various local Al Qaeda cells. Also, one needs to remember that Al Qaeda Central controls most of the finances in the organization. Thus, one realizes that decentralization does not mean lack of leadership. While Al Qaeda is decentralized, its level of decentralization is not as deep as ELF's.

The environment also affects terrorist organizational innovation. The decentralization process began in late 1990s for Al Qaeda,[176] and it decentralized even further after the US intervention in 2001. In 1990, Al Qaeda's Central Staff moved to Sudan, but in 1996 it moved back to Afghanistan. Although Mullah Omar, the Taliban leader offered Al Qaeda hospitality the whole Afghan environment was not friendly. There were portions of the country that did not fell

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[174] Sageman, Marc and Bruce Hoffman. 2008. Does Osama Still Call the Shots? Debating the Containment of Al Qaeda's Leadership. *Foreign Affairs.* Vol 87. No.4 p.163

[175] Bruce Hoffman. 2008.The Myth of Grassroots Terrorism: Why Osama bin Laden Still Matters. *Foreign Affairs.* Vol 87. No.3 p.133

[176] Sageman, Marc. p. 48

under Taliban control. The Taliban, after the withdrawal of the Soviets started fighting the

Northern Alliance throughout the 1990s and the fight still continues even today.

Afghanistan as a main base of operation for Al Qaeda was and still is a hostile

environment. At the end of 1990s, Al Qaeda had the Northern Alliance as an enemy in

Afghanistan and the US, which bombed in 1998 several Al Qaeda camps following Al Qaeda's

bombing of the US embassies in Tanzania and Kenya. Moreover, Afghanistan's population is

ethnically heterogeneous with groups such as the Pashtun, the Tajik, the Hazara, and the Uzbek

and religiously divided among Sunnis and Shia Muslims. Moreover, the environment became

even more hostile once the US troops and its NATO allies displaced the Taliban from power

following a military intervention of 2001. The Northern Alliance took over the governing of

Afghanistan with the US help. The deepest decentralization occurred in Al Qaeda following this

huge blow from the US which not only displaced Al Qaeda's hosts, the Taliban, but also Al

Qaeda itself. Thus, a hostile environment with various enemies has forced Al Qaeda to innovate

organizationally by adopting a new structure.

In addition to operating in a hostile environment, Al Qaeda is able to draw many capable

individuals from it. Sageman analyzed a sample from the four Al Qaeda clusters, and found that

out of 102 people "18 were upper class, 56 were middle class, and 28 were lower class"; out of

132 Al Qaeda members on which he had data, "over 60 percent have had at least some college

education, which makes them, as a group, more educated than the average person worldwide…"

and out of 134 people "57 were professionals (physicians, architect, preachers, teachers), 44 had

semiskilled occupations (police, military, mechanics, civil service, small business, and student),

and 33 were considered unskilled."[177] The environment provides Al Qaeda with people from the well off levels of the society, many educated members, and many professionals and semiskilled people. This data shows that Al Qaeda's decentralized network can find many skilled people who can conduct attacks without too much interference from the top. Most of the people from the sample can administer themselves and other members in a decentralized way due to their education and occupation, which are considerable assets for this organization.

Goals are also important for terrorist organizational innovation. Al Qaeda's main goal is to reestablish the caliphate. In order to do so, it sets a priority to strike the "far enemy" first, which supports the local apostate rulers and it issued a fatwa in 1998 named "Jihad against Jews and Crusaders":

"The ruling to kill the Americans and their allies – civilian and military – is an individual duty for every Muslim who can do it in any country in which it is possible to do it…We – with Allah's help – call on every Muslim who believes in Allah and wishes to be rewarded to comply with Allah's order to kill Americans…We also call on Muslim ulema, leaders, youth and soldiers to launch the raid on Satan's US troops and the devil's supporters allying with them, and to displace those who are behind them so that they may learn a lesson."[178]

In order to pursue the goal of reestablishing the caliphate, Al Qaeda's decentralized and less hierarchical structure serves this better. This way, Al Qaeda appeals to more people because it asks each individual Muslim to commit attacks against the US. Al Qaeda is not interested in directing each individual terrorist attack against the US. As long as the attack is committed by a Muslim who adheres to the goal of reestablishing the caliphate, Al Qaeda is content.

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[177] Ibid. p. 73-78

[178] Ibid. p. 19

Al Qaeda is a large terrorist organization with thousands of members which are spread over numerous countries. By becoming decentralized, it can better pursue its goal because if a certain cell or affiliate in a country is eliminated, all the other ones can continue the fight to establish the caliphate. In addition, by inspiring others to commit attacks on Al Qaeda's behalf, this organization not only does it encourage more like-minded terrorists to form their own cell, but it also expands the Jihad throughout the globe. Al Qaeda's goal is still far away from being achieved, but the fact that it adopted a decentralized and less hierarchical structure only aids the expansion of their struggle. Al Qaeda does not subject its members and affiliated groups to strict hierarchies and by allowing them to conduct their own attacks against the US and its allies, Al Qaeda lets these individuals and affiliated groups believe that they have an important role in global jihad to establish the caliphate.

Goals played an important role in how the ELF innovated organizationally too. The ELF goals according to statements from ELF press office on the Internet are:

"to educate the public on the atrocities committed against the environment and all of the species that cohabitate in it, to inflict maximum economic damage to those who profit from the destruction of the natural environment, to take all necessary precautions against harming any animal - human or non-human."[179]

The ELF, in order to save the environment, needs more than influencing policy in the UK, the US, and Canada. It needs a global reach to save the whole planet. By advocating to individuals to form autonomous cells, the ELF encourages anyone regardless of where the person lives to commit attacks in order to protect the environment. Thus, the ELF's goals affect its structure. The structure allows anybody to become a member, the only requirement being to attack targets that are perceived to destroy the environment.

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[179] http://www.elfpressoffice.org/theelf.html Accessed on November 28, 2009.

In addition to the characteristics and factors already analyzed, terrorist organizational innovation is also influenced by crisis situations. For example, the Provisional IRA innovated organizationally after it entered a crisis. In the 1970s, the PIRA was infiltrated by the British authorities.[180] The organization was in crisis because it was close to being shut down. The infiltration weakened the PIRA. The PIRA no longer trusted its structure of companies and battalions and switched to a structure of small cells and active service units, which were grouped on geographic brigades in mid-1970s.[181] Thus, organizational innovation occurred and the crisis situation was overcome by the PIRA. This organization survived after mid-1970s due to its newer and improved structure which became less prone to being infiltrated by the British authorities.

Al Qaeda also went through a crisis following the US intervention in Afghanistan in 2001. After 2001, Al Qaeda underwent its deepest decentralization. The organization was close to being eliminated in Afghanistan, but it withdrew most of its members to Pakistan or other parts of the world. The organization was in a serious crisis. By innovating organizationally it was able to overcome the crisis. Al Qaeda had much more presence on the Internet to recruit more people and also to inspire others to commit attacks on behalf of Al Qaeda. This organization, by becoming more decentralized made it harder for the US military to target it. It was spread out in small groups throughout Afghanistan and Pakistan. Al Qaeda by innovating organizationally was able to survive and to better adapt to the new situation.

Thus, cost, returns, efficiency, risk and uncertainty, complexity, leadership, environment, goals, and crisis situations influenced whether and how organizational innovation was adopted.

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[180] Crenshaw, Martha and John Pimlott. p. 214

[181] Ibid. p. 581-582

The latest trend in organizational innovation is for an organization to decentralize, to have a less hierarchical structure and to encourage autonomous cells to form. The ELF and Al Qaeda especially are indebted to their new organizational structures for being so resilient and being able to survive for a long time. An organizational innovation with low costs, high returns, low levels of risk and uncertainty, not too complex is more likely to be adopted than an innovation with contrary characteristics. Moreover, the leader as a decision maker or as a direction setter also influences how organizations innovate organizationally. In addition, the hostile environment and the organizations goals with global reach affect terrorist organizational innovation. An organization that faces a crisis is also very likely to adopt a new structure in order to overcome the crisis.

Chapter 7: Conclusions

Terrorist organizations innovate similarly to public and private organizations. Terrorist innovation is affected by the following factors: cost, returns on investment, efficiency, risk and uncertainty, complexity, leadership, environment, goals, and crisis situations. Moreover, terrorist innovation can be categorized in four types: technological, tactical, strategic, and organizational. Some of the terrorist organizations researched in this study innovate in only one way, but there are others that innovated in several ways. Organizations innovate primarily in order to survive, but also to grow and to pursue other goals.

With regards to technological innovation, terrorist organizations are influenced by the nine factors adopted from organizational and innovation theories. The cost of technological innovation limits the possibilities of innovation for organizations. Usually, the technological innovation with lower costs, such as building a website for communication, propaganda, and instructions is more likely to be adopted than a very costly innovation. However, there were organizations such as Aum Shinrikio that could afford high costs too.

In addition to this, technological innovations that bring returns on investment are more likely to be employed. Such examples are letter bombs like the ones used by the IRA and the Black September. The PFLP-GC built the altimeter bomb, which was activated by a pressure mechanism at a certain altitude. The altimeter bomb was responsible for bringing down several planes in midair. Moreover, efficient new technologies are more likely to be adopted than inefficient ones. McVeigh built a bomb out of very cheap materials, ammonium nitrate and fuel oil, but his bomb created a lot of human and material destruction. The IRA employed sniper rifles because they almost always got the job done.

Furthermore, organizations with higher tolerance to risk and uncertainty are also the most innovative. The IRA, even with the loss of many members, continued to improve its bomb making abilities making it one of the most innovative organizations working with bombs. Aum Shinrikyo also had a high tolerance to risk because its members were working with chemical and biological agents that can have a devastating effect for those working in such an environment. Also, technological innovations that are less complex tend to have a higher likelihood of being adopted. The RAF used the special ointment to prevent leaving fingerprints and the LTTE members used cyanide vials to prevent being caught alive. Hamas, Al Aqsa Martyrs Brigade, and Palestinian Islamic Jihad added an anticoagulant to their bombs to cause more damage. These were all technologies with a low complexity.

The leadership was important in affecting technological innovation. Ahmed Jibril of the PFLP-GC, Shoko Asahara of Aum, and Vellupillai Prabhakaran of the LTTE influenced how their organizations innovated technologically through their decisions and through showing the direction for innovation. In addition, organizations such as the IRA and the LTTE were influenced by the environment. The IRA was operating in a hostile environment composed of enemies and many rivals. The LTTE operated in a hostile environment too and destroyed dozens of rivals. This organization also had skilled people who had experience operating in a marine surrounded environment.

Goals too influence how terrorist organizations influence technologically. Organizations such as Aum and Al Qaeda with high goals innovated in a way that caused huge destruction. Aum, by wanting to bring about the apocalypse, developed sarin, a chemical agent with high capability of destruction. Al Qaeda transformed airplanes into weapons in order to pursue their goal of re-establishing the caliphate and to strike a huge blow to the US. Moreover, crisis

situations influenced how terrorist organizations innovated. The IRA built better bombs after being frustrated by the authorities and the RAF used the ointment that prevented fingerprints and thus were much safer. Both organizations overcame the crises by innovating.

With regards to tactical innovation, the organizations were influenced by the nine factors too. Low costs of a new tactic increase the chances of being adopted. Video captured beheadings and suicide bombings are two new terrorist tactics. They have very low costs. Hezbollah is considered by many responsible for the spread of the suicide tactic due to its successes in Lebanon. Also, the suicide element increases the devastation making suicide bombings and suicide missions to yield high returns on investment. The 9/11 suicide mission attack was not too expensive to carry out, but it caused about 3,000 deaths and billions of dollars in material damages.

If a new tactic is efficient, it is quite likely to be adopted. Hezbollah, by using suicide bombings, was able to make the US and French troops stationed in Lebanon leave that country. This tactic is also responsible for most of the deaths caused in the last few decades. Suicide bombings also present low degree of risk and uncertainty for organizations because the suicide individual dies in the attack with all the information he/she has about the organization. FARC, by training horses and dogs to carry bombs, reduces risks for the organization and for the members. In addition, low complexity tactics are more likely to be employed too. Riyadus-Salikhin Suicide Battalion booby-trapped enemy corpses, Hezbollah filmed their attacks, and Al Qaeda sends periodical video message threats to the US and its allies.

The leader plays an important role in tactical innovation too. Prabhakaran was the one who came with the idea of a human being carrying the bomb on him/her while committing the suicide bombing. Bin Laden decided to support Khalid Sheik Mohammed's plan to crash airplanes into

buildings in the US. Also, the environment factor was important in influencing tactical innovation. Hezbollah was operating in a hostile environment full of enemies and rivals. Hezbollah could draw "skilled" people from the environment, individuals willing to sacrifice for the cause. Moreover, the environment provided targeting opportunities in the US where abortion clinics were plentiful and where the first abortion clinic was attacked.

Goals have influenced tactical innovation too. Organizations such as Hezbollah and Riyadus-Salikhin Suicide Battalion (RAS) emphasized willingness to cause high casualties in forcing the foreign troops out of their each respective country. Hezbollah used car suicide bombings in pursuing their goals and RAS took many people hostage in their suicide missions. Both organizations caused several hundred deaths with these new tactics. On the other hand, anti-abortion groups have emphasized low lethality and their new tactic of targeting abortion clinics reflected it. Moreover, crisis situations influenced how terrorist organizations innovate tactically too. Hezbollah filmed its attacks only after it faced censorship from Israel and the PFLP-GC started using "mules" after its tactic with the altimeter bomb did not work anymore due to better airport security.

With regards to organizational innovation, the factors: cost, returns on investment, efficiency, risk and uncertainty, complexity, leadership, environment, goals and crisis situations had a great influence on it too. The costs for the strategy of kidnapping diplomats for internationalization of the struggle were quite small and that is why the Action for National Liberation (ALN), the Popular Revolutionary Vanguard (VPR), and the National Liberation Movement-Tupamaros employed this strategy. Most costs were associated with keeping the person alive, mainly by feeding him. Besides costs, this strategy was influenced by high returns on investment. By Latin American organizations kidnapping diplomats and PFLP hijacking

airplanes for internationalization of the struggle, these organizations were able to force their enemies to release members who were hold prisoners and also to internationalize their cause. These two new strategies were efficient because the organizations received worldwide publicity. The levels of risk and uncertainty were quite low because governments were pressured to cooperate and in the case of the PFLP, its members diverted the planes into countries considered safe by the terrorists.

Low complexity also played an important role in strategic innovation. The Red Brigades with the strategy of trial guerilla in trying to influence the court, only had to identify the court officials to be targeted and then they were assassinated. Furthermore, leadership played an important role on how organizations innovate. Wadi Haddad of the PFLP proposed the strategy of hijacking airplanes to the leader, George Habash, and he decided to support it. The PFLP was also in an environment with many rivals and enemies.

The PFLP, the ALN, and the VPR emphasized a low lethality strategy. They wanted to draw the world's attention and not to kill too many people. On the other hand, Aum's strategy of bringing about the apocalypse emphasized high lethality and that is why it tried to do it through WMDs. Besides this, crisis situations affected strategic innovation too. The PFLP was born out of a crisis, Israel instead of being defeated by its neighbors became even stronger by conquering additional territories from them. The PFLP realized that it could not longer rely on the Arab neighbors' forces and decided to adopt the new strategy. Aum was in crisis too, due to Asahara's loss of elections which had an impact on Aum's strategic innovation of bringing about the apocalypse with WMDs.

With regards to organizational innovation, the same factors borrowed from organizational and innovation theory proved to be important. In the recent decades, terrorist organizations

started to decentralize, to have a less hierarchical structure and to encourage autonomous cells to form. Al Qaeda and the ELF are two examples of decentralized and less hierarchical organizations, with the ELF being the more decentralized of the two. Cost influenced Al Qaeda's organizational innovation because, by decentralizing, it had less people on the payroll and it preferred a method of giving individuals "seed" money that were supposed to be multiplied in order to carry out attacks. Also, the ELF with its decentralized structure proved that it can yield high returns on investment. An autonomous cell was able to cause over $12 million dollars in material damages to a ski resort in Colorado.

Additionally, efficiency played an important role in influencing organizational innovation. An Al Qaeda member living in UK set up a system of online recruitment for this organization that worked even after his arrest. An Al Qaeda inspired cell that committed the London train bombings in 2004 not only did it cause much destruction but it also influenced the outcome of the Prime Minister election in Spain, which brought along the withdrawal of the Spanish troops from Iraq. Besides this, a low degree of risk and uncertainty also influenced Al Qaeda and the ELF. Both organizations are safer from being dismantled due to their decentralized structure and to the low hierarchy involved as opposed to a traditional hierarchical one. These organizations and their terrorist cells, by having members who are related to one another or who are friends, are less likely to be turned in to the authorities.

Furthermore, an organizational innovation with a low complexity is much more likely to be adopted. The ELF's elements of complexity: horizontal differentiation, vertical differentiation, and geographical dispersion suggest that it is a low complexity organization. Al Qaeda's geographical dispersion is complex, but the other two elements have low complexity. Besides this, leadership is affecting organizational innovation too. Bin Laden allowed the

organization to become decentralized by relinquishing much of his power and Zawahiri encouraged the formation of autonomous cells to carry out attacks.

The hostile environment also influenced how Al Qaeda innovated organizationally. Enemies forced this organization to decentralize in order to survive. Al Qaeda also had an environment that provided it with educated and skilled people who could have important roles in administering the organization in a decentralized structure. The goal of reestablishing the caliphate influenced organizational innovation too in Al Qaeda's case. In a decentralized structure, each individual member and cell can have the impression that they play an important role towards pursuing the goal. The ELF by wanting to save the environment and by advocating that anyone can be a member has influenced how to innovate organizationally and it favors the formation of autonomous cells. Besides all these factors, Al Qaeda also went through a crisis after the US intervention in Afghanistan. In order to overcome the crisis, Al Qaeda underwent the deepest decentralization following the event.

Thus, terrorist organizations innovate technologically, tactically, strategically, and organizationally. Many of the factors that affect public and private organizations affect terrorist innovation too. Cost, returns on investment, efficiency, risk and uncertainty, complexity, leadership, environment, goals, and crisis situations all have an influence on whether and how a terrorist organization will innovate. A terrorist technological, tactical, strategic, and organizational innovation is more likely to be adopted if it is characterized by low costs, high returns, efficiency, low degree of risk and uncertainty, and reduced complexity. The leader as a decision maker and as a direction setter affects how terrorist innovate too. The hostile environment makes terrorist organizations fight harder for survival and increases their chances to innovate. Goals are also important, because organizations with ambitious goals tend to be more

innovative. Crisis situations pressure terrorist organizations to innovate because it leads to survival.

Some of the terrorist organizations analyzed in this study proved to be innovative only in one way. Organizations such as the ALN, the VPR, and the Tupamaros were innovative strategically and the ELF was innovative organizationally. On the other hand, the LTTE innovated technologically and tactically, Aum innovated technologically and strategically, while Al Qaeda innovated technologically, tactically, and organizationally. Typically, the most lethal types of terrorist innovations are the technological and the tactical types of innovations. Therefore, governments and counterterrorist organizations should set as a priority to disrupt or eliminate organizations that innovate technologically or tactically. However, organizational innovation can lead to resiliency for those organizations engaged in this type of innovation and are much harder to dismantle.

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