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A regional, market oriented governance for disaster management: A new planning approach

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ABSTRACT

This paper proposes a regional competitive governance and management of response and recovery from disasters. It presents problems experienced in major disasters, analyzes the failures, and suggests how a competitive system that relies on private and volunteer regional leaders, personnel, and capital can improve preparation, response and recovery efforts over the existing government system. A Public Choice approach is adopted to explain why government often fails, and how regional governance may be socially more efficient than the existing federal- state-local funded and managed disaster system. The paper suggests that the federal role might change from both funding and supplying aid in disasters to merely funding disaster recovery efforts. When a disaster occurs, available businesses and government resources in the region can be utilized under a competitive system. These resources could replace existing federal and state inventories and emergency personnel. An independent regionally controlled and managed council, which also develops its own financial resources, and local volunteer leaders are key for success. The paper suggests a new planning method that utilizes the statistical Factor Analysis methodology to derive an efficient organizational and functional model to confront disasters.

1. Introduction

Preparation, response, and recovery services from disasters have traditionally been considered public goods and all three levels of government have been involved in these activities. Local governments provide the immediate response services of police, fire and other emergency providers. The state and the federal government, mostly through FEMA, both supply and fund the response and recovery efforts to natural disasters. Deficiencies in the delivery of emergency disaster services have caused a public and mass-media outcry, which has led to improvements in technology and management efforts. For example, the failure of all three levels of government during and in the aftermath of the 2005 Katrina and Rita hurricanes and the media exposure of government activities led to somewhat improved services for Sandy in 2012.

We have witnessed improvements in early notification of residents in affected areas by cellphones of approaching storms, creation of fusion centers that bring together emergency responders from both the public and private sectors, and in interoperability of communication systems. However, partially due to the rigidity of government, which limits managerial and technological innovations and a lack of sufficient funding, changes are still insufficient and experts claim that we are still unprepared for terrorist or natural catastrophes (Flynn, 2007).

This paper draws from the public choice, planning, homeland security and public administration literature evidence of failures, mostly related to bureaucratic behavior, which led to ineffective government response and recovery efforts. Then, we identify remedies or factors that could address these failures, and suggest an organizational model that relies on market forces that make use of regional specific information to address these failures. Such a market-oriented model could help create catastrophe resilient regions.

The common planning process starts with defining the problems, a statement of goals and objectives and their relative weights, development of alternative plans, evaluation of these plans, and selection of the preferred alternative that maximizes the welfare of the specific entity. Here, we structured our analysis in a somewhat different way to yield the preferred solution. The planning methodology is a conceptual statistical model of Factor Analysis. The overall problem addressed is the inefficient response and recovery efforts (Sobel & Leeson, 2007). We outline twelve problems suggested in Public Choice and Public Administration literature as contributing to inefficiency in past government controlled disaster services. Then, four factors are identified that

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address in a non-mutually exclusive, or non-orthogonal, manner these twelve problems. The four factors address these problems and serve as a base for a functional and organizational plan to improve disaster management. These four factors are then applied to our suggested organizational and functional plan. Fig. 1 illustrates our conceptual planning process.

Section 2 draws from major academic studies twelve failures or behavioral variables that contributed to ineffective government disaster response and recovery experiences. Then, in Section 3 we derive four factors that may help correct these failures. These factors lead us in section 4 to a plan that is hypothesized to better manage preparation, response and recovery from disasters than existing practices. Section 5 summarizes the paper and provides some insights for the functionality of the model, and its consistency with effective planning.

2. Evaluation of existing government disaster management

The academic field of Public Choice explains why leaders in government often behave in a manner that maximize their own self-interest which often does not coincide with the goals of government or social interests, thereby yielding inefficient outcomes. We expect government to allocate resources in a manner that maximize societal goals. However, its actual behavior is determined, at least partially, by the self-interest intersection of legislators, government executives, and other officials while those with greater "weight" are able to tilt planning, budgets, and activities in their direction. Legislators are influenced by voters' preferences, and lobbying groups in their efforts to be (re)elected (Healy & Malhotra, 2009). Often, even the interest of legislators and their subordinate officials may not coincide. A review of academic and professional literature on disasters reveals twelve major problems that lead to inefficient response and recovery efforts when government manages such disaster activities.

a. Short-term view. Legislators and executives need to show immediate success in order to satisfy their constituents. As such, short-term visible services tend to be over-funded while services that exhibit success in the longer run tend to be under-funded. Public choice scholars (Stroup & Baden, 1979) have dealt with this phenomenon, sometimes called the shortsightedness effect, in the past. Local elected officials usually hold office for a short time, perhaps four or eight years, during which a major disaster has a low probability of occurring. If a disaster occurs in the distant future, few would attribute blame to insufficiently low spending on homeland security by a past official. Further, if the public attributes blame, the official is likely no longer in office. That problem also exists for large corporations where executives are judged by immediate profits. A corporation that underperforms in the short run is subject to takeovers that could imperil the executives' positions. Under-investments in research and development may result from such a short-term focus.[1] Even not-for-profit executives have to appeal to donors and need to exhibit short-term successes with less regard to more beneficial long-term goals. It might even be the case that the larger is a business or the non-for-profit organization, the more significant is the short-term view. Examples for the government focus on the short-term include not fortifying levees in New Orleans or under-funding state employee pensions and retiree healthcare that must be paid for in the future. City officials prefer to beautify the lakefront, which provides immediate benefits rather than fortifying the levees that protect the community from a future disaster. (Congleton, 2006; Hakim et al., 2016; Shughart, 2006, 2011; Sobel and Leeson, 2006). Corporations also often underfund their pension systems (Norris, 2012).

b. Type 1 and 2 errors. A type 1 error occurs when a risky action is taken and turns out to be undesired. As such, public officials are blamed. A type 2 error is when no action is taken and people get hurt but the officials cannot be readily and clearly blamed. Everyone can observe when a mistake is made while avoiding a risky action is less noticeable and blame cannot be easily attributed. Officials therefore are risk averse and try to avoid type 1 errors. Avoiding or delaying evacuation when a hurricane is forecasted, a type 2 error, eliminates public anger if the hurricane does not occur. This avoidance of the less noticeable risk, type 2 error, is a common bureaucratic behavior (Sobel & Leeson, 2006).

c. Visibility and political gain. Both elected officials and bureaucrats allocate resources to visible activities that benefit constituents and glorify the officials and bureaucrats while minimizing spending on activities that may yield higher net social benefits in the long term. In addition, presidents and governors can use declaration of disasters to promote political interests (Shughart, 2006; Sobel & Leeson, 2006). Legislators are subjected to the preferences of their constituents. Voters reward public leaders that provide effective response and relief efforts and are less supportive in budget allocation for preparedness activities, even though equal spending on preparedness is often worth more in avoided losses than spending on response and recovery efforts once a disaster has occurred. Moreover, voters reward good response only if elections are held close to the time of the disaster. Even then such support diminishes quickly as time elapses. Thus, public executives and legislators are sensitive to political gains and less to the relative effectiveness of budget allocation (Healy, & Malhotra, 2009; Shughart, 2011). Herman and Howitt (2010) termed the dangers of significant future natural disaster as the Sleeping Dragon, claiming that slaying it now in its sleep will yield a high ratio of future benefits and costs than delaying until the dragon awakes or the threat materializes. However, political gains preclude such current spending in favor of visible outcomes with lower net benefits. Spending on counterterrorism and screening can be much more visible than natural disaster prevention. Officials often advertise and promote stories of successful attempts to uncover terrorist plots, which garner national attention. Investments in airport and security screening are also visible signs of addressing terrorism. The effectiveness of these measures is difficult to assess. A 2015 study conducted by the Department of Homeland Security found that Transportation Security Administration screening agents failed to identify viable security threats like weapons, fake explosives, etc. in 95% of the test cases (Costello & Johnson, 2015). Voter/taxpayers are largely unaware of this ineffectiveness, yet observe the investments in terrorism prevention, and may see it as policymaker's commitment to fighting terrorism.

d. "Tragedy of the commons". This failure relates to under-spending on security in the private sector and in particular by private infrastructure companies. Markets may yield private protection against disasters below their own private values. As more private infrastructure companies participate in any local market, competition stiffens, and more resources are shifted from non-immediate functions to satisfy short-term production needs to lower their costs. For example, competition forces firms to lower costs and shift resources from research and development and security to direct marketing and production (Flynn, 2007; Hardin, 1968; Weaver, 2005; Waldman and Jensen, 2007: 492).

e. Unpredictable or external impacts of disaster. Public decisions about spending on homeland security should depend on social cost-benefit findings that include external costs. Private infrastructure companies base their spending on security mainly on private costs and benefits that accrue to them in disasters while ignoring or, at least, under-estimating external costs. Also, the risk or the probability of a disaster occurrence is often unknowable which further adds to the difficulty of accurately estimating expected costs. Thus, both public and private entities cannot determine the correct spending on security (Mueller & Stewart, 2011). Local governments in their budget allocation

[1] "CEOs, who are paid mostly in stock and live in fear of being punished by the markets, race to meet stock market target numbers rather than simply making the best long term decisions for their business. One National Bureau of Economic Research study found that 80% of executives would forgo innovation-generating spending if it meant missing their quarterly earnings figures. It is a system that as behavioral economist Nobel laureate Robert Shiller puts it has emerged from "convenience rather than logic." (Foroohar, 2015).

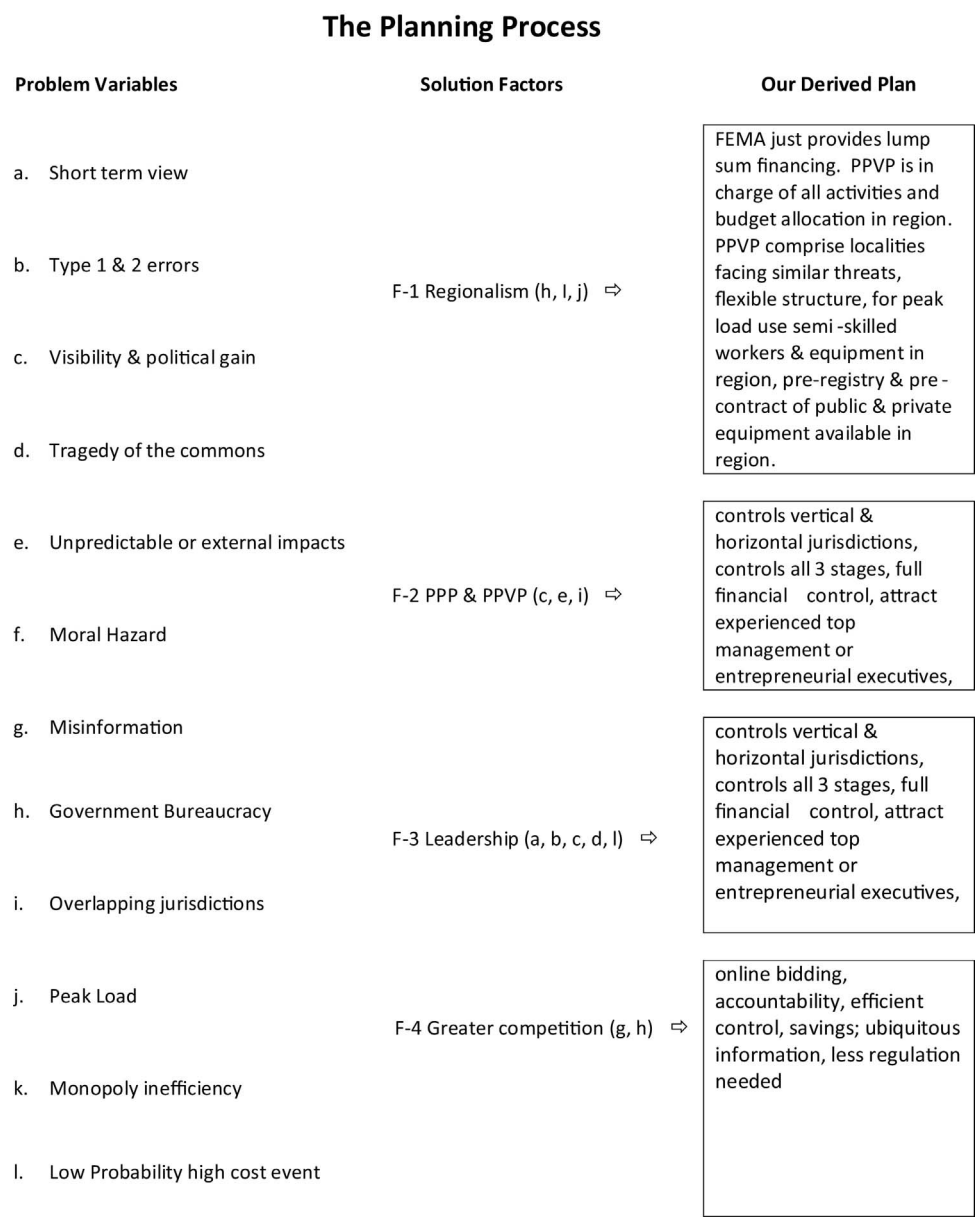

Fig. 1. The Planning Process.

on homeland security act like private firms by under-estimating external costs that occur beyond their own jurisdictional boundaries. However, the federal government is more likely to take into its budget allocations a full costs consideration, if such costs are internal to the nation's boundaries (Roberts, 2008).

f. Moral Hazard. When private infrastructure managers expect the federal and state governments to compensate them for damages resulting from a disaster, they undertake fewer precautions than is socially appropriate, or remain living in natural disaster prone areas (Pauly, 1968; Shughart, 2011). Households and businesses underspend on security measures or under-insure or ignore requirements for insurance against natural disasters since they witnessed past government compensation and expect government to act similarly if a disaster occurs (Kunreuther & Pauly, 2006; Shughart, 2011). The same is true for localities that underspend on security, expecting state and federal governments to defray damages if a disaster occurs (Flynn, 2004; Shughart, 2006). Prescott and Kydland (1977) suggest that rational actors take into account future government actions in calculating their long-term present value. Indeed, government could even announce that it does not support protection against floods in a specific wetland. Nevertheless, private contractors will build in the area, recognizing that once buildings are erected, government will protect them in spite of past pronouncements. Thus, current decisions become suboptimal because government will respond to de-facto future situations.

g. Government actions yields misinformation. Since government provides victims free assistance and monetary payments for losses, they have an incentive to inflate the amount requested (Sobel & Leeson, 2006). Insurance companies usually manage the actual inspection of claims. In disasters, there are an overwhelming number of claims that must be handled by insurers and, in most cases, by independent adjusters who are typically paid a percentage of the claims, and thus the approved amounts are likely to be inflated.

h. Government bureaucracy. The large size and multiple bureaucratic levels of government and a perceived zero marginal cost of their workers makes the approval process for funding and supply cumbersome and time consuming for both response and recovery efforts. This complex process for approval of activities that traverses through several individuals makes obstruction easy and is referred to by Sobel and Leeson (2006) as "the Tragedy of the Anti-Commons." In large bureaucratic corporations, this phenomenon of difficult approval for action

has been called the problem of the "abominable no-man" (Scherer, 1988). Decision makers at the top attempt to limit the responsibilities of subordinates. They are separated by layers of bureaucrats from those who are in the field and are most familiar with the disaster effects. Thus, inefficient and often wrong decisions are made due to the vertically steep government managerial structure (Shughart, 2011). As indicated by Coyne et al. (2009) FEMA's move under the umbrella of the Department of Homeland Security in 2003 exposed disaster relief to additional layers of this bureaucracy.

This phenomenon is common for most large organizations that enjoy monopolistic power. In large business and government entities, executives often suffer a loss of managerial control due to information lost in a multi-level managerial hierarchy. As such, these entities experience diseconomies of scale in comparison to smaller entities with flatter hierarchy where information is more easily transmitted, and thus their executives maintain greater grasp of the operation. (Canhack, 2006). Bureaucracy in multilevel large entities often contributes to rigidity in behavior and performance. For example, police have rigid pre-specified procedures to secure an area in crisis instead of immediate intervention, occasionally causing prolonged suffering of victims. Police prohibited access to the superdome in New Orleans to private sector trucks trying to aid the evacuees who were hungry and lacked essential supplies. During 2016 flooding in Baton Rouge, LA, volunteers re-formed the "Cajun Navy", which was initially formed during Hurricane Katrina. This group used boats owned by volunteers to rescue people impacted by the flooding. This response used already existing resources that were not being effectively employed by government agencies. Some of the local authorities attempted to barricade neighborhoods of the city and prevented the boats from entering, and state Senator Jonathan Perry recommended additional requirements in order for these volunteers to continue with rescue missions (Richardson, 2016). Another example is drawn from the month long 2006 Lebanese war in Israel (Katz et al., 2007). The Hezbollah were shelling 300–400 rockets a day onto northern Israel, causing one million area residents to become refugees in other parts of the country. The State's government agencies did not adjust well to the emergency. National and local authorities' offices were mostly closed; officials were largely inactive in providing relief services while volunteers filled the void. Only in the fourth week of the war did government agencies provide significant help to the displaced population and the elderly and sick that remained in the north (Katz et al., 2007).

i. Overlapping jurisdictions. Local, state, and special districts often horizontally overlap in their responsibilities over the same critical infrastructure (CI). The fragmented and overlapping jurisdictions empowered to maintain CI like levees in New Orleans enabled each agency to avoid its responsibility, causing insufficient spending on the upkeep (Shughart, 2006, 2011). This overlapping of responsibilities occurs also in the vertical chain of command starting with the top federal level. This contributes to an inconsistency in expectations both across agencies and from citizens, making coordination in recovery and prevention increasingly costly.

j. Peak load problem. All three levels of government often have insufficient resources during times of disaster. Further, such resources are typically available in the region under the control of private or public entities that could be easily mobilized with advanced preparation (Wallace, 2009). Police, fire and medical services are designed in size and content for their normal and routine activities and not for disaster time demand. Inadequate supply at peak demand time is also a typical problem for electric, natural gas, and water utilities that are regulated local monopolies and have limited ability to raise their prices at peak load times. In most other industries, when demand rises, suppliers increase the price to eliminate the excess demand or peak load problem. When a disaster occurs at an unpredictable time and scope, the demand for public emergency services increases beyond existing capacity. Under the prevailing framework, state and federal agencies provide the necessary resources at zero prices (Hakim et al., 2016). Sometimes, municipalities or states have agreements with other states or municipalities to provide assistance in emergencies. For example, in the 2015 social disturbances in Baltimore, New Jersey sent 150 state troopers with the expectation that Maryland would reimburse it. During Hurricanes Katrina and Sandy, several first response teams of state and volunteer organizations headed to the disaster areas.

k. Monopoly inefficiency. Government agencies, like business monopolies or dominant firms in general, are slow to innovate. For example, government was slow to use technology in the security field that had been adopted much earlier by private firms; cameras and license plate readers are examples. Dominant firms often wait for another firm to innovate and if the innovation proves successful, the monopoly firm then copies the innovation and sometime even supplants the innovating firm (Baldwin & Childs, 1969). For example, even though Kodak had the capability, it was slow to enter digital photography and lost its dominance in amateur photography.

l. Low probability-high cost event. Executives in both the public and private sectors consider the expected cost (total damages) to their entity in their decision whether and how much to invest in preventive activities. The expected cost is the multiplication of the perceived probability of a disaster by the realized cost if a disaster occurs. There are several reasons for favoring investment in a high probability adverse event with low realized cost rather than in a lower probability event with higher realized cost even when both investments yield the same reduction in the expected cost. First, executive's tenure whether public or private, is relatively short and therefore they tend to favor investment in high probability events even if the expected costs are less than those of lower probability events. The second reason is, again, the moral hazard phenomenon. When a low probability-high cost disaster occurs, the federal government will aid in the relief and recovery efforts (Hayes & Ebinger, 2011). Thus, it is personally more rewarding for the executive to invest in the high probability-lower cost event even if the spending on the former is more expensive for the same expected cost. Indeed, an empirical study showed that expected government support resulted in lower private spending on security (Hayes & Ebinger, 2011). A third reason for avoiding investment in a low probability event is that further reduction in that probability is not perceived as valuable (Mueller & Stewart, 2011). Finally, it is important to note that the levels of both risk and therefore the expected cost are difficult to determine in any case (Hayes & Ebinger, 2011). Therefore, investing in low probability events can easily be dismissed.

3. Factors addressing the twelve failures

These twelve failures distort efficient use of resources in the preparation, response to, and recovery from disasters. An efficient solution must address these failures while being constrained by the constitutional democratic principles of government. These failures are largely associated with biased attitudes and lack of entrepreneurial spirit of government and non-government executives and the rigidities often associated with government. Spending on preparedness is likely to be below the socially desired or efficient level while spending on recovery efforts is likely to exceed the efficient level. Spending on security by the private sector is below both private and socially desired levels because of, among other reasons, externalities and the lack of competition. Creation of homeland security partnerships between government and business exposes the production to competition. However, since governments do not charge for their services and supplies, or their price is considered zero, such services are often over supplied. Volunteers might give less weight to individual interest and greater weight to concern for the public good. After all, that is the reason many volunteer. Thus, adding the volunteer sector as partners to government and the business sectors could yield more efficient resource allocation and strengthen the regional control for all homeland security services.

The twelve failures discussed in section 2 may be ameliorated by the

four factors of regional homeland security control and management, Public-Private-Partnerships enhanced by volunteers (or PPVP), leaders selected for their professional experiences and skills, restructuring FEMA's role and replacing government production with competition (Fig. 1). These factors address, not necessarily in a mutual exclusive fashion, all the failures listed previously. They are justified by theory and experiences derived from public choice and public administration sources. This planning procedure deviates from the "traditional" planning process by avoiding the development and evaluation of alternative plans to select the preferred one. In our suggested planning procedure, we derive the factors that address the problems and then design the plan that seems the best to incorporate these factors. A more comprehensive planning procedure could include the relative importance and thus the weights of the factors to be incorporated in the designed plan. These weights could be determined by a Delphi procedure as implemented by Hakim and Weinblatt (1993). However, in this paper, we chose not to incorporate the weighting process in favor of maintaining a focused presentation.

Regional Councils: Homeland security events have shown a lack of coordination in response and recovery efforts among both vertical and horizontal government and special district agencies. Public administration experts have argued that regional systems, particularly in metropolitan areas, can help cities and counties become more cost-effective in their efforts. Regional structures could help improve interpersonal networks, which are vital in disaster situations. Regional councils (PPVP) also enjoy economies of scale in preparing first response forces. Indeed, in 2004–2005 governors started to provide homeland security grants to regional councils instead of the existing local political jurisdictions. Florida and Texas were among the first states to adopt regional councils as the recipients of state funds for homeland security (Caruson et al., 2005). It is unlikely that the direct and indirect impacts of a disaster are confined to political boundaries and therefore effective preparation, response and recovery efforts should normally be conducted at a level larger than local level but smaller than the state. The lack of coordination and communication among the key emergency personnel of the local governments often hampers effective response (Caruson et al., 2005). The problems are best handled at the regional level and the best management is close to the problem area. Both federal and state officials are remote and lack the immediate contact that is needed for effective control.

Regional councils appear to be appropriate for metropolitan areas that contain highly vulnerable CI. In addition, most emergency resources that FEMA and the states provide in disasters are probably available but are unknown or inaccessible in the region and they could have been used as needed. BENS (2006) suggests that a registry of resources available from businesses should be developed and that prior to the disaster these resources could be contracted for supply during a disaster at normal market prices. Similar arrangements could be made with volunteer groups that when needed would dispatch personnel. Former Mayor Wallace of Sugar Land Texas (2009) planned a Regional Logistics Center. A private company warehoused supplies for emergency use by local governments. The Center would include both a pre-contracted registry of emergency inventory in the region and stored inventory that would suffice for response and recovery efforts for the first five days after the disaster. The Center will permit self-reliance before out-of- region supplies become available from federal and state governments. Cooperation among such regional centers, similar to the interregional functioning of Walmart and Home Depot during and after Katrina, could provide for efficient shipments to the disaster area. Emergence of "Just on time" supply, ease of online purchasing, and online improved transport logistics enables limiting storage at the center just for the immediate needs that follow the onset of the disaster.

Regional councils (PPVPs) can replace both the state and localities in obtaining federal and state Homeland Security (HLS) grants as in Texas (Caruson et al., 2005). The advantages of the regional councils include exploiting economies of scale and scope, improving often existing weak relationships between county and local officials, replacing peacetime political leaders with professional leaders, establishing uniformity of communication systems for first responders, taking advantage of region specific decentralized information, and creating an effective structure that transcends traditional jurisdictional boundaries to respond and recover from disasters. Politicians often claim credit for supplying public goods, including homeland security, sometimes causing their possible oversupply (Roberts, 2008). In the regional council's governing body, businesses, and volunteers share control and credit for successes, incentives for savings prevail, and oversupply of homeland security services can be avoided. These regional PPVPs would be a move toward a more polycentric governance structure from a monocentric top-down disaster relief system. As explained by Ostrom et al. (1961:831; Ostrom, 2010): "Polycentric" connotes many centers of decision making that are formally independent of each other." This proposed structure is contrary to the existing centralized federal level monocentric organization where all state and local agencies are subject to decision-making made at the top level from the Department of Homeland Security and its agencies.

A crucial issue is how to determine the size of such regions. A region should be an area that confronts a specific natural or terrorist disaster, is composed of entire municipal units, allows reasonable time access by first responders, and the Council's executives can easily inspect them. The size of the region should consider economies of scale and scope in the production of these HLS services. The State could authorize such councils and in case of overlapping states, an interstate compact would be necessary. The definition of a region may differ for natural disasters or terrorism. A region with both a high cost and probability of natural disasters should combine localities that confront similar threats. For example, the barrier islands of Southern New Jersey that are subject to ocean flooding or part of southern California that are subject to frequent fires could each be designated as such a region. Such councils are suggested mostly for areas of high-expected losses when disasters occur. Regions subjected to terrorism are most often large metropolitan areas containing such critical or vulnerable infrastructures as airports, sport arenas and concentrated entertainment centers.

In New Jersey there are already eight business disaster partnerships that include many N.J. based Fortune 500 firms. They provide some or all of the web-based registries of business resources that can be called upon in disasters, information sharing based on satellite data casting system, and business fusion centers. Similar business or PPPs were formed in Georgia, Massachusetts, Metro Kansas City, the San Francisco Bay area, and Iowa. Clearly, the PPVPs could differ in the services provided and the membership composition, depending upon the type of disaster expected in each region. BENS (2011) suggests that the following be included in the regional PPPs: quick and reliable communications, supply-chain management for resources and medications, ongoing information sharing, CI risk assessments, and conducting regular exercises to identify problems (BENS, 2011: 31–40). It is important for these polycentric regional PPPs and councils to control and manage their own plans as autonomous governing agencies. Federal authorities should not supersede this system whenever a disaster occurs. Plans could be tailored by each region with confidence that will be used if a disaster occurs. Under the current system, much of the planning is subject to changing FEMA actions that often supersede lower level planning. Further, "… in order for a system to be accurately characterized as polycentric, the acting organizations must be both autonomous and effectively constrained by rule of law. The encroachments of FEMA on the autonomous plans of lower level organizations … indicate that the (current) U.S. system shares many of the characteristics of a monocentric order" (Coyne and Lemke, 2011: 4).

Public-Private-Volunteers Partnerships (PPVP): In the US 85 percent of crucial and vulnerable CIs are owned by private entities. The federal government establishes regulations for the minimum levels of security and monitors compliance for these CIs. In a disaster, local emergency forces are assumed to incorporate sufficient first response

workforce and equipment to mitigate immediate adverse effects. Existing public-private homeland security efforts are concerned with CI and are formulated to keep businesses and industrial sectors operating during and following disasters. Businesses should and often are concerned with the functional long-term continuity of the entire affected community; Individual businesses cannot survive if their community is paralyzed (BENS, 2006). However, businesses often have a short time horizon and seek immediate profits. They have limited available resources and tend to underspend on security efforts, expecting government to manage catastrophic events. Thus, such partnerships are of low priority in preparing for a disaster. As we witnessed in the previous section, both government and businesses separately have inherent difficulties in addressing disasters and at the same time have not been able to establish effective partnerships to prepare and respond to disasters. A catalyst is obviously needed to create an effective, market oriented, and self-propelled entity in homeland security. An effective partnership should address the specific objectives of the members and yield a socially desired level and composition of HLS services. Lack of adequate incentives for each member reduces the effectiveness of the partnership. A generic objective of "improving homeland security in the region" is insufficient. Each regional partnership should prepare for the specific threats in that region. For example, PPVPs in the southeast should chiefly prepare for hurricanes, in major cities like New York for a terrorist attack, for earthquakes in the west, and at the eastern shores for flooding (e.g. BENS, 2006, 2007, 2011). The issue is clearly to design the incentives that would create the self-sustained socially desired mix of services. However, as stated above, these PPVPs also should have the ability to alter these preparation and recovery activities in accordance to regionally specific information, direction, and changing circumstances.

PPPs are usually formed to save resources or produce more efficiently than does government. They are designed to share resources, risks and rewards, and exhaust the comparative advantages of the partners. However, it is unclear whether the social goals of security are attained by replacing government by PPPs (Dunn-Cavelty and Suter, 2009; Stewart et al., 2009). The problem that most researchers observe is how to integrate social goals into the fabric of PPPs in the security field so that their operations attain them. In other words, it is important to incorporate market incentives into the operation of PPPs to attain the same social security goals that would be achieved by the alternative of government regulation or its own operation. PPPs enable more efficient production than government, attributed to competitive contracting-out process. However, contracts do not guarantee performance during a disaster since contractors sometimes lack sufficient resources to fulfill the contract (Stewart et al., 2009). Moreover, some disaster services, like law enforcement, are non-quantifiable and thus it is difficult to ensure that a contractor delivers the appropriate level and quality. It is possible to quantify the inputs used for the service. However, to allow innovations and efficiency in the production of the service, contracts are better enumerated in outputs than inputs.

During wars and major disasters, government expands its activities and budgets related to such events. Often, government is reluctant to contract after the crisis is concluded. Higgs (2009) terms the trend the "ratchet effect" where government powers or spending are unlikely to return to their previous position in part because those who benefit from increased government activity lobby to prevent reduction. Examples for such government tendency include WW2, the "New Deal", the Vietnam War, and the 2008-banking crisis. If, however, government is exposed to competition in its operations, and partners with the private and volunteer sectors in responding and recovering from disasters, the "ratchet effect" is likely to be reduced.

Personal interests and actions of public and private officials may not coincide with their own entities' goals and may be further remote from social welfare goals and objectives. Volunteers who devote their time and other resources and may even risk their lives are likely more attuned to social goals or to the specific community welfare goals and objectives. Volunteers often direct their efforts to support the disadvantaged population that suffers most in disasters.

This assertion is supported by worldwide experiences where volunteers devoted their resources to aid the victims at times of disaster. Non-Government Organizations (NGOs) played a major role immediately following the hurricanes in New Orleans and the Caribbean islands, the Tsunami in Far East Asia, the mudslide in the Philippines, 9/11 in NYC, the earthquake in Bam, Iran, and the 2006 Lebanese war in Israel, among other disasters (Fritz Institute, 2005; Katz et al., 2007Kapucu, 2008) study centered on government and volunteers during the Lebanese war showed that both the state and local governments were dysfunctional during the first three weeks of the war. Practically no relief activities were evident to assist both the refugees from northern Israel, which was under rocket fire and the population that could not relocate. Government offices were closed and officials were largely absent. At the same time, volunteer groups were prompt to respond, showed flexibility in diverting resources from their regular activities to support disaster relief activities, and helped at relief sites. These organizations provided food, services to people with special needs, and general welfare services to refugees. These organizations seem to adjust to changing challenges, and are able to act immediately when aid is needed. Indeed, 60 percent of all NGOs that were active after the Asian Tsunami started to provide help on the first day following the disaster (Fritz Institute, 2005). Immediately following the 9/11 attack, volunteer organizations provided food, blankets, physical and psychological assistance to the disadvantaged population (Guggenheimer et al., 2003).

Volunteer organizations often provide immediate, effective, and flexible responses because of their familiarity with the disadvantaged population in their community, their prompt decision making which is often informal and done by their executives without the need to obtain any approvals, their flexibility in hiring and in use of volunteer labor and capital. Government inflexibility, rigidity in adjusting to new circumstances, and complex hierarchical structure with limited authority allowed the lower levels created a void that was filled by the volunteer organizations (Katz et al., 2007). The combination of the scope of disasters, the population dependent on external help, and the absence of government involvement created conditions that prompt the initiatives of the volunteer or third sector (Billis & Glennerster, 1998). However, the third sector suffers from some distinct weaknesses while acting in disaster situations. Many of these organizations lack an organized plan, and they often respond in a non-formal and non-professional manner. Also, their chronic lack of resources limits the scope of their efforts (Salamon et al., 2000). Sometimes volunteers may not appear. Nevertheless, it appears that the third sector could play an important role at disasters while controlling its built-in weaknesses.

An example of a volunteer organization that operates under government auspices is the Boston Medical Reserve Corps (BMRC). The program was created by the US government in 2002 and operates under the control of the US Surgeon General. The BMRC was established in 2003 and is part of the Boston Public Health Commission's Emergency Preparedness Division. The program trained volunteer physicians, nurses, pharmacists, and other health workers, and other ancillary personnel to help in such medical emergencies as communicable disease epidemics, biological terrorism, or nuclear attack. The volunteers numbered 1600 by 2006. Members are recruited through website, advertising in Boston newspapers, and advertisements in subway cars and stations, especially on subway lines that reach hospitals, among other methods. BMRC even trains managers who supervise medical disaster relief sites. In 2006 a measles outbreak occurred, centered on the John Hancock Building. The BMRC assisted the Boston Public Health Department in inoculating the potentially exposed building occupants who did not have provable measles vaccinations (Menino, 2009).

The Chicago fire of 1871 is another example where volunteers increase their involvement when government played a small role. The

Mayor delegated the Chicago Relief and Aid Society to control and manage all relief activities in the aftermath of the fire. It was a bottom-up effort where high level business leaders and civic minded leaders formed their own governing unit that provided services to the victims of the disaster regardless of the jurisdictional boundaries. The volunteers, part of the Chicago community, had a long-term interest in the recovery of Chicago. This relief agency was responsible for a successful and rapid recovery. Clearly, this experience shows that when government does not perform, volunteers often take the lead and can be effective. This experience is contrary to our current situation where government uses a monocentric approach that provides a limited role for volunteers to contribute (Skarbek, 2014).

As of 2017, federal and state governments control both the funding and management of the relief operation in disasters. FEMA and state agencies provide the needed supplies, some rescue forces, and even have the power of preventing for profit firms and not-for-profits from providing aid. Under a PPP system, some services and supplies are being contracted out but governments still control both the funding and the management of the disaster. Former Indianapolis Mayor Stephen Goldsmith allowed city workers to compete on equal terms with private providers on public services that were opened for bidding. Goldsmith termed the government involvement "a managed competition" model. Government remains the funding source but competes with the private sector in the provision of the service (Goldsmith, 2000).

Leadership: A usual multi-level governmental hierarchy is characterized by time-consuming decisions, difficulty in coordinating efforts, and rigidity in response that is contrary to the needs in disaster relief. A flatter structure simplifies coordination and enables rapid response in disasters. A more horizontal structure allows a shift from top-down to greater bottom-up management and control and better flow of information. Such a system is termed network governance and is more suited for disaster response. Indeed, effective disaster management requires a flat hierarchical structure, which is usually a typical for government. A shift from hierarchical to a flat structure could make communication and coordinating actions more effective among the many disparate actors (Busch & Givens, 2012). Such a change could call for a shift from typical government officials to leaders that are used to acting with a greater degree of freedom. Waugh and Streib (2006) also recognize the fact that emergency management capacity is built from the ground up in order to expedite response. Federal and state agencies should concentrate on public education, alert warning systems, and evacuation plans while the actual management of disasters should be controlled by lower level entities characterized by a flatter structure. Waugh and Streib (2006), who base their analysis on the Congressional Hearings that followed Katrina, stated that leadership was the critical and missing element in the poor response to Katrina. A good leader is more important for effective response than even the command structure. The desired leader for disaster management should be flexible, able to adjust to changing circumstances, imaginative, and possess initiative and drive. A leader in disaster management should have a vision, strategic thinking, and have no predisposition to hierarchy or management control. Goldsmith and Eggers (2004) emphasized that the key requirement for a leader in disasters is flexibility since speedy action in rapidly changing circumstances is often necessary. Speedy response is difficult in a hierarchical government-like decision structure. Centralized structures are often a prescription for delays in approving and dispatching disaster assistance (Waugh & Streib, 2006).

In section 2 we outlined the reasons, as discussed by public choice scholars, why government and business officials' incentives tend to be influenced by personal gains and losses, and these do not necessarily reflect social objectives. Elected mayors and county executives are experienced in managing regular peacetime activities, but past HLS events show that they could be unprepared or unsuited to cope with major disasters. However, in most regions there are experienced leaders that are interested, and qualified in planning and managing disasters. They may include retired senior military officers or top business executives. Such leaders often inherit at least some of the following attributes: are financially secure, have high integrity and a proven record of innovating, have built an enterprise or managed an organization and dealt with unexpected crises. Michael Bloomberg is such an entrepreneur in the telecommunications field. While mayor of New York City he contributed equipment from his companies and accepted compensation of only $1 a year (Coyne & Lemke, 2011). His reelection for two additional terms attests to his often non-traditional promotion and management of the city. Former Governor Schwarzenegger is another example of a successful businessperson and actor who contributed his talents as Governor of California. Indeed, even at the founding of the U.S, a businessperson and inventor, Benjamin Franklin, helped the fledgling country by serving as ambassador to France. Mitt Romney, a founder and head of Bain Capital, a company that acquired such familiar companies as Staples and Toys R Us, later became governor of Massachusetts, rescued the Salt Lake City Winter Olympics, and was a candidate for president of the U.S. The late Senator Frank Lautenberg of New Jersey pioneered in building ADP, a company that manages wage and other payments for large companies who later turned to public service. Most recently, the billionaire, Donald Trump is the President of the U.S. for a salary of $1 a year. There are many examples of generals who managed large military or, subsequently, other organizations that chose to devote their efforts to public service. Perhaps none as obvious as former President Dwight D. Eisenhower who previously led allied forces in WWII and then served as the president of Columbia University. His leadership in the D-Day invasion of Europe was obviously a great accomplishment. Business and military leaders who succeeded in their careers are likely to succeed and benefit the public in preparation and management for, during and following major disasters. Disasters involve frequent and non-conventional events that require immediate response, improvisation, and innovative approaches that differ from the relatively stable management of government. Business leaders and generals often have experienced large events similar to disasters that require innovative leadership and improvisation. They are likely to perform at least as well as elected officials and government civil servants who often lack business and entrepreneurship skills and experience.

Competition: Walmart's involvement in Katrina provides support to regionalism, and PPVP in the control and management in disasters (Horwitz, 2009). Walmart used its "war room" to plan for its business and volunteer activities five days before Katrina arrived. High level executives were sent to the region, the stores in the region were closely coordinated, on-site executives were given full authority in making decisions without the necessity for bureaucratic approval from the national team, and they had the power to provide free supplies to the community. Walmart's view is long term in establishing an image of a good corporate citizen. The stores' executives and employees live in the community and are concerned with both their employer and the community. Walmart, and other large employers in the area like Home Depot, had a different response to Katrina than FEMA's executives and employees, who seem to have a short-run view and are often not part of the region's community. These examples provide justification for greater business and volunteer involvement in PPVP to manage and control the planning, response, and recovery from disasters. Similar desirable response efforts by the business community occurred in the case of the Joplin tornado in 2011. National charities and businesses, the local business community, and volunteers with knowledge of the community assisted in the response and mostly in the recovery efforts (Smith & Sutter, 2013).

Shughart (2011) concluded, contrary to general belief, that response in disaster is a private service, and brought evidence that the federal level of FEMA is inefficient in providing the service. He further brought examples for the success of private vendors in providing such disaster services. His conclusion was that except for the National Guard, local police and firefighters, disaster services should be shifted to the private sector. Our model below enhances and develops further Shughart's

findings.

4. Our derived plan

The discussion in section 2 outlines 12 failures related to government and private companies that prevent communities from reaching socially desired levels of preparation, response, and recovery from major disasters. The monopolistic stance of government provision of emergency services lacks incentives in achieving private efficient services. Relevant insights and real world examples were drawn from the planning, public choice and public administration literature in order to illustrate these points. Then, in section 3 we outlined four factors that address these failures and if implemented might well improve delivery of emergency services and achieve greater efficiency. We integrated these factors by constructing a conceptual model on how to improve preparation for, response to, and recovery from disasters by incorporating the voluntary or the third sector, enhancing competition, changing the structure and level of control, and improving accountability in the system.

When the president or the governor declares a state of emergency, services are rendered by FEMA and/or state agencies like the National Guard. FEMA has some supplies in its warehouses and often purchases supplies and transfers them to the emergency site. The state often sends relief personnel and supplies to the emergency site. The major services provided by the state include emergency responders, the state police, and the National Guard.

FEMA plays a dual role assisting localities in the event of a declared national disaster. It provides both funds and services for response and recovery efforts. Equipment and services from its own warehouses or purchased in open markets are usually provided at a zero price. The lack of FEMA's presence at the site usually leads to misallocation of resources. Usually a shortage, excess, or unsuited supply of equipment and services are sent to the affected region. There seem to be three reasons for the lack of efficient federal government support. First is the monopolistic stance of FEMA, that is, it is likely to buy at above market prices and provide inefficient supply to the disaster area. Second, the lack of adequate onsite information by federal agents leads to exaggerated demands from the state and the localities about the needed help. Third is the dual role of the funding and the actual supply by the federal government. Our model suggests that FEMA should concentrate on just funding the relief activities of the federal government. The funding will take the form of a lump sum amount equal to what it would cost FEMA to provide the services. Standards for the reimbursement of all individual damages could be developed in a manner similar to the standards used by insurers for determining damages to homes and businesses. However, the actual supply of services is shifted, as in Florida, to regional homeland security councils that will completely control the preparation, response, and recovery services. This approach utilizes the decentralized regional information (consistent with Solution Factors 1 and 4 in Fig. 1), which is a great benefit of polycentric orders, in comparison to the centralized FEMA allocation process. As indicated by Coyne (2011), and quoted in section 3, it is very important within this new polycentric approach that the regional councils and agencies operating under them have autonomous decision making powers. Decision-making may occur at different levels in accordance to the region's specific needs, but these decision-making levels must be specified and this information must be ubiquitously available, and thus, consistent with our Solution Factor 4, which advocates for a competitive approach and increased information available to both public and private actors. In addition to the benefits of regional response and funding decisions listed above, this approach may also limit government corruption by regionally coordinated control and oversight of funding. Using data from 1990 to 2002, Leeson and Sobel (2008) find that federal disaster funding financed through FEMA was associated with higher levels of corruption by state and local governments that received this funding. As modeled by Solution Factors 1 and 2 this regional and competitive approach should reduce these threats of corruption through higher accountability and more stable funding and planning.

Homeland security efforts could be transformed from the centralized FEMA structure that is operated through 10 multi-state regional agencies to smaller regional councils. The Regional Public-Private-Volunteer Partnership (PPVP) will comprise several localities that are similar in their exposure to threats regardless of their existing jurisdictional boundaries (Factors 1, and 2). A Council could be formed for a region that faces a similar and an expected high cost natural or terrorist disaster. The size of the region under the Council depends also upon the utilization of economies of scale and scope. Not all regions in the US would require establishment of such a Council. The Council would control all Homeland Security services of the vertical entities, federal, state, counties, localities and special districts, and purchases in normal supply markets (Factors 1, 3, and 4). When a disaster occurs, the council assumes full control on the impacted region which in peacetime in usually managed by individual political jurisdictions. The difference between existing systems and the council is that government is not in control in this model but rather shares control with the private and volunteer sectors. In addition, the proposed regional council (PPVP) should be flexible in both its membership structure and geographical contents. A disaster is an uncertain event that could extend beyond a defined region and could affect a different area than foreseen in the initiation stage of the Council. Thus, the defined region for homeland security should be flexible and include margins of responsibilities beyond their official boundaries. Indeed, the Tsunami disaster has already led to a recommendation of a similar holistic Public-Private-Volunteer-Partnership (PPVP) (Perry, 2007). It is important to state that failures to react to disasters led FEMA to form ten semi-independent multi-state regions in the US. However, such large regions preclude efficient local control and management of disasters (Factors 2, and 3).

Goldsmith's (2000), Goldsmith and Eggers (2004) model provide a base for a regional supply of labor and capital. Before a disaster, the Council contracts through online bidding for future services. The contract could remain open with regard to the exact quantity of the service, which will be determined when the disaster occurs. Both private and public entities will be allowed to compete for such services, and suppliers in such a monopolistically competitive market will try to gain contracts from emergency councils in their own and other regions (Factor 4).

The experience of Walmart and Home Depot during the Katrina natural disaster provides a good lesson for the operation of our Council. Stores far removed from the affected regions cooperated with the stores and activities in the affected region. Material, equipment, and work force were shifted among the stores and for business reasons and humanitarian purposes in the affected region. Thus, interrelationships among councils sharing technology, workforce, and management techniques in the preparation stage, and shipment of material, equipment and work force in the response and recovery efforts are crucial for success. Such horizontal networking that exists in businesses could be adopted for our model. Hurricane Katrina showed that horizontal business-like cooperation is more effective than existing inter-governmental vertical cooperation (Factor 2).

Most Public Private Partnerships (PPP) are controlled, continuously monitored, and regulated by government. PPPs were designed to improve efficiency in the delivery of services. Their role in this model is to enhance security. Network governance models call for a change in the traditional role of government, which is now limited to activation, stimulation, and coordination (Cavelty & Suter, 2009). In this model, networks become self-regulated. The Council becomes financially independent of government, which enables it to pursue competitive market behavior. Active involvement of volunteers in a security network helps orient its goals to improve security while at the same time allow it to act efficiently under market conditions (Factor 2).

The board of the Council includes relevant local stakeholders:

mayors, top executives of major businesses that are crucial for supplies before, during a disaster and in the recovery activities, executives of CI, volunteer organizations of the region, and representatives of both FEMA and the state governments. The Council chooses a president who is in charge of all HLS operations subject to the direction and assistance of the board members. A key for success is allowing a suitable volunteer to control the operations of the Council.

Failures a, b, c, and k in Section 2 and Fig. 1 reflect biased or inefficient considerations made by public officials when preparing for disasters. Failures e and j reflect on the professional skills needed for leaders that are not a usual attribute of political leaders. Thus, it appears that professional leadership of homeland security may be less subject to political pressures and may be socially better suited to lead homeland security efforts than elected officials (factor 3).

On occasion, such leaders volunteer for public service as a stepping-stone towards an elected position. Involvement of such leaders in regional homeland security positions may provide new ideas and methods to existing public bureaucracy. Top military officers and business executives are aware that in crisis, the leader has to manage the rescue operation at the scene where the problems are observed first hand and personal attendance encourages and motivates emergency forces (Factor 3).

The Council has complete freedom in their choice of the leader. It may select a local mayor or a businessperson who shows entrepreneurial skills, ability, and experience in managing disaster situations. The selected leader can pursue the mission freely while the Council members play an assisting and general policy guidance role. The roles here should parallel those in corporations between the Board and the CEO (Factor 3).

When a renowned business or military leader heads a regional homeland security entity, it will attract other mid-level managers to join in order to enhance relationships with other leaders in the community and become members of such an “elite club.” It is likely that most regions include such leaders as residents.

Under existing homeland security organization, elected officials and government appointed professionals lead and manage emergency response. Under our suggested organizational structure, the choice of the suitable leaders expands to include both private business executives and volunteers from the region. The greater choice should improve the selection of the best person for the job.

When a disaster occurs, localities face significant shortages in semi-skilled workers including, among others, law enforcement officers and firefighters, (Blackstone & Hakim, 2010). However, every region has active and retired private security guards, private corporation emergency personnel, and medical providers and fire fighters that could be used and trained to participate in disaster services. Nationwide, there are more than three times the number of private security officers than the combined federal, state and local law enforcement agents (Blackstone & Hakim, 2010). These private security officers are trained for their jobs and are usually registered with the state. Such usually low paid workers cannot and should not be expected to volunteer their services. Often, the National Guard and other emergency personnel are sent to the disaster area while there are sufficient emergency personnel in the region that with appropriate training could fulfill the tasks. Meanwhile, the social cost of displacing National Guard members from their everyday tasks is considerable. Most commercial establishments are closed during disasters and these private security officers are not being paid. It is possible to register and train those who want to provide service during disasters. When an emergency occurs, private guards could be deputized if needed to supplement the existing police forces and fulfill temporarily duties of law enforcement agents. Such workers should be paid their market wages. Using the National Guard for emergency services includes direct payments, the opportunity costs of their regular employment, and leisure time. The state would pay the council for these services at the level of their own costs. If the Council is able to obtain necessary labor resources at less than the state funded rate, it may keep the savings and use them for other homeland security efforts. The option of using the state pool of resources is available but the possibility of achieving savings encourages the Council to consider preparing its own force (Factors 1, 2).

Volunteers can be used for semi-skilled tasks and be signed up at colleges and universities, churches and fraternal organizations, retiree, and emergency response groups. It is essential that volunteers register long before a disaster occurs, background checks are performed, and specific training provided. Volunteers should be engaged periodically in training and practice exercises and not be involved merely when a disaster occurs. The state usually provides localities with names of volunteers. Registration could be done on the state’s or the region’s website. Two such successful registry programs are the California Disaster Volunteer Network and the Washington State Emergency Registry of Volunteers. Volunteers that show up spontaneously at a disaster site without prior registry and training usually cause complications. The gathering site for these volunteers should be away from the disaster area. A limited number of volunteers can still be drafted before a disaster is expected in a planned fashion for such tasks as filling sandbags and cleaning ruble (Steen, 2014) (Factor 2).

When a disaster occurs, there is excessive demand for buses, trailers, lift trucks and other heavy equipment that is beyond available equipment of municipal and county governments. At times of disaster, similar equipment in the private sector may be idle. Registry of all public and private equipment should be prepared along with clear delivery options, leasing agreements, and payments (Wallace, 2009). In the preparation stage, reverse auctioning is recommended for the acquisition of potentially needed equipment and periodically checked for proper use, future contracts are signed, and operators are assigned to specific equipment. Businesses, local governments, non-for-profit entities, and volunteer groups who own such equipment are all allowed to participate in the auction. This auctioning process will incentivize registration, as individuals could profit from their idle equipment only if that equipment is registered. This also provides the local authorities an indication of the idle equipment still available during a disaster (Factors 1, 4).

The four keys for success of the Council are that it controls the entire homeland security budget and not be dependent on various political jurisdictions for funding. As mentioned in the previous section, in order for polycentric governance structures like this Council to operate efficiently they must be autonomous in their rulemaking. It is also imperative that the Council replaces other political jurisdiction on all homeland security issues, is not created as an additional layer, and gains complete control of services at emergency periods. Allowing the Council to keep its savings is the third key for success, and it has important long-term implications for the Council’s continuing viability and strength. The incentive to save and use the extra resources to enhance homeland security services in the region encourages innovation and efficient use of resources as evident in other competitive markets. Government agencies may choose to reduce funding for such independent entities in order to recapture control of homeland security efforts. Thus, financial strength of the regional councils (or PPVPs) emanating from such savings and possibly development of other independent financial initiatives could prevent “take over” efforts. Again, a volunteer leader with a strong background in business, the military, or government could withstand such pressures and be inclined to develop independent funding sources that will ensure the continuation of the Council. However, the fourth key for success is the selection of a champion to head the operations of the Council. The champion should be a successful leader who is usually not subject to political or narrow business pressure, and is financially secure (Factors 1–4).

Public Private Partnerships often improve efficiency of service delivery over that of government. However, in many cases personal interests of elected officials and top executives of both sectors prevent reaching socially desired outcomes. Introducing the volunteer sector and in particular the higher echelon governance may shift the outcomes

towards the socially desired level. Introduction of competition while allowing as many qualified public, private and volunteer groups to compete is expected to encourage efficiency in the production of the necessary services. The existence of auctioning over the internet allows ubiquitous dissemination of information about demand for services and thus greater competition among potential suppliers, which should lead to better quality of services at lower prices than those experienced when government is the supplier (Factors 3, 4).

Another possible action of the Council that could improve social efficiency is to encourage the private sector and in particular owners of CI to increase their provision of security. Reliance on government delivery of disaster services lowers spending by private CI on preventive and response services. Owners of CI spend on preventive measures as long as their own marginal cost is lower than their expected private damages and loss of production resulting from an attack. This does not include the negative externalities resulting from an attack on the CI as they are not required to compensate those that suffer. Government by appropriate regulation should incentivize the owners of the CI to increase the amount they spend on preventive activities by the amount of the negative externalities. If the enforcement of the regulation to spend on security for the expected negative externalities is successful, CI will be highly protected while sites with lower negative externalities will unfortunately tend to be more susceptible to attacks. The Council could require owners of CI in the region to insure or self-insure to include both private costs and the negative externalities. Thus, such regulation will yield either an increase in spending on preventive activities for CI or reimbursement of the Council for its costs for response and recovery in case of a disaster. The Council should maintain the principle that each CI is fully responsible in case of a disaster for both its own losses and the resulting external costs. There is little justification for government to bear the costs of preventive activities or any of the response and recovery costs for CI (Factor 3).

Insurance is an efficient market alternative to direct regulation. Insurance policies for homeland security have provisions that allow the insurer to encourage some preventive activities. For example, such a policy could discourage construction of structures that do not minimize potential earthquake damages. Insurance companies will use experts to advise them how to reduce risk exposure and design discounts that could encourage mitigating activities by CI owners. Competition among insurance companies will lead to efficient incentives and pricing of preventive activities. Thus, competitively inspired insurance planners and inspectors might replace some government spending and imposition of regulation (Kunreuther, 2006; Sutter, 2008; Orszag, 2003) (Factor 4).

Our model suggests how government shifts from financing and provider of services to a lesser role of regulator or the preferred role of encouraging greater participation by businesses and volunteers. In section 2 (f) we discussed private construction on floodplains knowing that government will have no choice but to provide flood services once the area is populated. A possible government policy to improve security of homes on floodplains or against earthquakes is allowing extra building space if the new owner elevates the building as well as strengthening the foundations to reduce expected damages from earthquakes. The locality bears no financial commitments while engaging private sector resources to improve HLS (Factor 4).

Stephen Goldsmith's "Managed Competition" model applies to the funding and management of regional disaster services. In the case of federally declared disaster, FEMA provides funding to the state, which in turn transfers it to the regional council (PPVP). The regional council contracts for supplies and labor before or during an event as a "managed competition" model, allowing government, businesses or volunteer organizations to compete (Factors 1, 3, and 4).

5. Summary and conclusions

This paper recognizes twelve failures suggested in public choice and public administration research that yield more socially inefficient preparation, response and recovery activities by government in disasters. Then, based on the existing literature, we suggest four factors that could address these twelve failures in search of a more efficient solution. These four factors provide the base in developing a model that helps correct the twelve failures. Fig. 1 illustrates the flowchart of our planning process.

A disaster, whether natural or a terrorist act, is a low probability event, but if it occurs, the expected costs are high. In case of a terrorist attack, the attacker has great freedom in choosing the target, the timing, and the method while the victim is likely unaware of these factors. This asymmetric information usually makes highly effective protection of all critical infrastructures difficult or very costly. The low probability of an attack and the lack of knowledge of the nature of any attack, make allocation of funding on protecting critical infrastructure below the appropriate level. Political gains make higher probability but lower expected costs event likely to be funded. For example, building an underpass in an intersection with some accidents could yield smaller expected social net benefits than equal outlays of raising the height of levees. However, the underpass is likely to get priority in funding. A major reason is that politicians and business executives have a short run interest limited to their expected tenure on the job. They need to show achievements in the short run, and therefore spending on security or on research and development is likely to be underfunded.

This study identifies enhancement of PPP by volunteers, and shifting responsibilities from all three hierarchical levels of government and horizontal political jurisdictions to a flexible regional entity. This approach is consistent with the literature on polycentric governance structures that tend to increase efficiency and government performance in resource allocation. Most importantly, the new regional entity is less politically constrained. This regional council could select a leader, preferably a volunteer, who resides in the region, with proven entrepreneurial or managerial skills. Such a leader will have considerable power and could attract other skillful volunteers from the business world in the region to join in the homeland security efforts.

Public Choice economists suggest that Individual interests of legislators, public executives, and lobbying groups influence government actions that could deviate from the interests of the community. The monopolistic stance of government makes such actions possible. Introducing competition to government in preparation, response and recovery efforts might improve efficiency and better match community interests. Scholars in public administration and economics suggest Public-Private-Partnerships (PPP) where each entity contributes its comparative advantage to the process. However, interests of business often conflict with public interests. Further, business executives, politicians and government officials often have interests that differ from their own entity's, causing them to deviate from their own entity's and the community's interests. Control and management of disasters in much of the world has traditionally been by government where first response is managed by local governments while some responsibilities rest with the state (e.g. National Guard), and others with the federal government. In recent years, PPPs have been suggested to correct X-inefficiency of government. Based on both analysis and evidence, we suggest that the partnership should be expanded to include the volunteer sector in the control and management activities. This will shift interests and activities closer to the welfare of the community.

Local management of response to disaster often seems to be unprofessional and lacking in sufficient supplies and equipment. Control and supply by state and federal officials who are remote from the disaster area and have insufficient information results in misallocations of disaster services. A shift of both budgets and activities to a regional council might enable more effective control and management of disasters. As evidenced by Chamlee-Wright and Storr (2008), expectations between government disaster response agencies and citizens impacted by a disaster are often inconsistent with actual outcomes and government allocations. Using citizens' surveys about

the government response to Katrina, they claim that citizens overwhelmingly indicated that the government has the capacity to respond effectively, but that these agencies lack the intent. Thus, a regional council that aligns both the incentives of local and regional leaders and actors with the economies of scale and effective control from the regional end would improve performance. Solution Factors 1 and 3 within our derived plan address these issues.

Introduction of competition, volunteers, relevant local business executives, and independent and entrepreneurial leaders, while reducing the role of government might enhance control and management of disasters. Most importantly, this shift will introduce incentives for managerial and technological innovations. The shift from government bureaucracy to a competitive setting and introduction of incentives to save enables greater flexibility by the regional council. Such regional councils will presumably cooperate and learn from each other's experiences. Transparency of management enables learning and adoption of practices and procedures from other regional entities. The establishment of interoperability communication systems among such regional councils, and the ubiquitous availability of information to suppliers and constituents make such a model attractive in comparison to existing government control and management. The other key for success is the introduction of competition in the supply and production of homeland security services (See also Sobel & Leeson 2007). Our model suggests that a reduction in the role of government might gradually occur as the role of volunteers and businesses rises.

Our plan suggests greater reliance on lower skilled labor during a time of disaster. Police, fire, and medical services are designed for regular activity periods. However, in a disaster demand for all first responders rise while some on the serving staff is often absent. During Hurricane Katrina, many police officers did not report for work, understandably remaining to assist their own families. However, private security officers, private firefighters, medical staff, drivers, buses, and other equipment are mostly idle during disasters, and could be shifted to aid victims. The regional council and the competitive system could ease the transfer of such resources to aid response and recovery efforts.

Public Choice theories provide an explanation for inefficient government activities that emanate from personal interests of elected and executive officials. Our suggested plan does not address all such inefficient acts of private and government executives. For example, the plan does not suggest corrective actions to the moral hazard problem. It also does not correct for possible future inconsistent behavior of government. Our model is based on economic, planning, and public administration theories and experiences in major disasters. Clearly, the plan should be tested in parts or as a whole for a limited time before being implemented. Experimental economic behavioral studies that address homeland security in general and disaster management in particular could improve public policy in this field.

Finally, this paper suggests a planning procedure and evaluation of existing government organization and practices at disasters. It then leads to the development of a possibly more efficient plan. This procedure is distinct from the traditional planning method that involves the development and evaluation of alternative plans and then the selection of the preferred plan. This procedure, which is based on the statistical model of Factor Analysis, seems to lead to an efficient organizational and functional plan for disaster management. Clearly, detailed plans and implementation to some disaster prone regions should be done before general implementation.

This paper does not distinguish between the necessary organizational structure for natural disasters and terrorism. In the case of natural disasters, historical evidence provides the range of likely damages and the probability of such events. In the case of a terrorist event, the nature, the extent of damages, the probability of occurrence are all unknown. These two distinctively different events may dictate modification in the organizational and functional model suggested. A follow up study could analyze whether the organizational structure and activities should differ for regions that are likely to face natural disasters from regions that are more likely to experience terrorist disaster.

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