Institutional and emergent improvisation in response to disasters in Slovenia

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Abstract: The purpose of the paper is to check the level of institutional and emergent improvisation during recent disaster responses in Slovenia. The main data source is a research project on the formation of a comprehensive Incident Command System within the Slovenian disaster response system. Triangulation of methods included the analysis of selected secondary sources and a scoping study of recent research on improvisation, analysis of recent disaster cases in the country, and a comparison of improvisation-related experiences. Findings suggest **organisations** adopted different ways to activate their disaster response forces, changed procedures and how they covered disaster response costs, established new management and coordination structures, and revised existing operational modes and communication channels. The improvised solutions ranged from minor adaptations of procedures to the establishment of new structures. **Emergent actors** provided help to most affected people, labour, logistical, and communication support. They emerged from both affected communities and outside them.

Keywords: disaster; disaster response; preparedness; planning; improvisation; organisation; emergent actor; coordination; institution; Incident Command System.

Reference to this paper should be made as follows: Malešič, M. (2021) 'Institutional and emergent improvisation in response to disasters in Slovenia', *Int. J. Emergency Management*, Vol. 17, No. 2, pp.138–153.

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1 Introduction

One of the main tasks of contemporary states is to protect people, their property, animals, cultural goods, and the environment during disasters. To achieve that in an optimal way, the states perform activities in the fields of detecting, predicting, and preventing disasters,

preparedness (planning, training, exercising, etc.), search and rescue, and post-disaster reconstruction. They also develop various disaster response systems; perhaps the best known among them is the USA's Incident Command System (ICS) (see e.g., Moynihan, 2009; Jensen and Thompson, 2016; Kendra and Wachtendorf, 2016). The ICS envisages the formation of a temporary hierarchical structure, with an individual incident commander (or unified command) that coordinates and directs the activities of all involved response actors in the fields of command, operations, logistics, planning, and finances and administration. In the USA, the system is universal and its action is obligatory in all disasters and other crises, and should be used by all organisations that respond to them. Several other countries followed the USA's model (Jensen and Thompson, 2016; Malešič, 2020).[1] Data from the USA and some other countries, e.g., Norway, Japan, New Zealand, France, China, Taiwan, and Slovenia (Malešič, 2020), reveal that the ICS functions relatively successfully during small and routine disasters whereas difficulties increase with the level of disaster complexity and with a higher number of involved response actors. Therefore, a certain level of improvisation is necessary even though the ICS was formed to prevent or minimise improvisation.

At first impression, this might suggest that improvisation is something bad, and perhaps even a sign of the organisation's failure; however, this is not the case. Researchers around the world have paid attention to improvisation in disaster response and the findings are encouraging. In this paper we will first theoretically conceptualise improvisation and classify it. We will emphasise here that improvisation in disaster response is not performed only by organisations but also by emergent individuals and groups. Then we will provide a review of recent research in the field, focussing on several cases of improvisation in disaster response. The main part of the analysis will introduce recent cases of improvisation during disaster response in Slovenia, a country that is frequently hit by various disasters. Key findings of the analysis will be offered in the conclusions section of this paper.

The analysis is guided by the following research questions about improvisation during disaster response in Slovenia: What kind of improvised actions performed by organisations have been predominant? What have been the most significant characteristics of the emergent actors' improvisation? How has the fact that the response system already formally incorporated volunteer actors (firefighters, Mountain Rescue Service, speleologists, divers, Red Cross, dog trainers, etc.) influenced the level of improvisation of emergent actors?

Triangulation of methods was used to explore the topic. At the beginning of the present study, selected secondary sources, such as scientific papers and monographs on the improvisation, were collected and analysed. A scoping study was applied to summarise the main characteristics of improvisation as explored by colleagues in various countries. Then, an analysis of recent disaster cases in Slovenia was conducted: the wildfire in 2003, flash floods in 2007, a storm in 2008, floods caused by prolonged rainfall in 2010, sleet in 2014, and a large-scale fire at a hazardous waste storage site in 2017. The primary criteria in case selection were actuality, the scope of the disasters and their consequences, and the extent of improvisation in the response to the disasters. We also juxtaposed and compared various improvisation-related experiences to search for potential universal features of improvisation during disaster response.

2 Theoretical background

This section defines improvisation through a brief theoretical introduction, and explores the relationship between preparedness (planning) and improvisation, and between organisational and emergent improvisation. It also offers a typology of improvisation.

Improvisation is a significant feature of every disaster. It plays an "important role in emergency management, where training, practice and knowledge of both the field and community serve as repertoires of material emergency managers can draw upon in the ambiguous and dynamic conditions of a disaster where not every need has been anticipated or accounted for" (Kendra and Wachtendorf, 2006, p.2). Or, improvisation is "the spontaneous and creative process of attempting to achieve an objective in a new way" (Vera and Crossan, 2004, p.727). Improvisation is not inherently good or bad: it may create either order or chaos, and it may contribute positively to the problem-solving or become part of the problem. Weick (1998) suggests that improvisation is a transformation of some original model, i.e., it takes place in real time and tries to follow the original model as much as possible but also expands on it.

2.1 Preparedness (planning) and improvisation

Disaster planning is of tremendous importance for adequate response to an event. According to Alexander (2020), emergency planning should be holistic and responsive. A plan as a document should be constantly refined, updated, and known to those who will use it. The plan should be logical, systematic, include previous knowledge and experiences, and enable rational use of resources.

The plan should summarise institutional knowledge that exceeds the knowledge and experiences of individuals involved in previous disasters. Through the planning process, the organisation envisages possible scenarios of disaster and their development; it also stimulates the development of (in)formal networks, and enables coordination among organisations. The improvisation, on the other hand, is a way of processing knowledge and experience to timely perform a new action, as required by unclear and dynamic circumstances that were not (entirely) envisaged by the plan (comp. Wachtendorf and Kendra, 2005). "We plan in detail so we do not have to improvise, knowing that we will have to improvise" (Kendra and Wachtendorf, 2006, p.1).

Disasters affect society but do not destroy it. The disorganisation that we witness after a disaster is in essence the adaptation of the community to a changing environment and new circumstances (Wachtendorf and Kendra, 2005). When the normative framework does not provide adequate direction to joint action, the involved actors should perform on their own and improvise in order to cope with the disaster. Nevertheless, newly created solutions are tightly connected to the solutions envisaged in the pre-disaster period. Structures formed in advance, planned actions, jurisdictions, and resources represent a basis for disaster-related decision-making. Planning brings about a certain level of stability in terms of organisational structures, roles, tasks and responsibilities, resources, and the physical environment; this also holds in situations that require performance of unplanned actions. Concurrently, the need for improvisation emerges due to the inability of plans to properly take into account one or more specific requirements. It is not practical nor feasible to envisage all possible scenarios of a disaster's course. Disaster response without improvisation loses the adaptability and efficiency required by changing circumstances. Even a modest level of preparedness enhances the possibility to

improvise. Hence, preparedness (planning) and improvisation are closely connected phenomena. Mendonca et al. (2014) also emphasise the importance of both planning and improvising to effective response activities.

The ratio between planned activities and improvised activities varies. According to Mendonca et al. (2014), emergency response actions range from conventional to improvised. Disaster response teams' enactment of improvisation takes place "in terms of a spectrum of deviance that ranges from slight deviation to total overhaul" (Deterala and Villar, 2019, p.5). Or, "improvisations may range from simple substitution of planned-for personnel and equipment to more profound changes, such as a development of new procedures" (Mendonca et al., 2014, p.2).

Wachtendorf and Kendra (2005) offer a typology of improvisation on the basis of the nature of actions taken. Under the time pressure brought about by the disaster, the rules of response change, and this is reflected in the process of improvisation. The improvisation is **reproductive** when the organisation re-produces a destroyed or disturbed element of the system (i.e., structure, activity, source, or task), **adaptive** when the organisation re-shapes an element of the system that is no longer recognised as adequate, and **creative** when the organisation forms a new element for the system.[2] Improvisation during a disaster becomes even more complex as it does not necessarily follow various degrees, but is, as far as objectives and needed changes are concerned, subject to qualitative shifts.

We believe that it is equally important to classify improvisation on the basis of the nature of actors that perform it. Improvisation can be **organisational** or **emergent**. The former is performed by formal institutions and organisations, whereas the latter is performed by informal emergent actors, or spontaneous voluntary individuals and groups. Organisational actors rely on preparedness, plans, procedures, and existing resources whereas emergent actors predominantly use their general knowledge, life experiences, and provisional equipment. In some cases of disasters, organisational and emergent actors might improvise in concert (**combined** improvisation) (Table 1).

2.2 Organisational improvisation

Organisations create a certain system for use during disasters, but disturbed functioning negatively effects the performance of activities and tasks, destabilises organisational structures, and destroys or limits the use of resources (Wachtendorf and Kendra, 2005). In response to changing circumstances, the organisation decides whether the system's original elements are still necessary and appropriate. In such a case, the involved stakeholders must improvise to do what is necessary and adequately respond to the disaster. The organisation or group of organisations observe the changing environment, search for meaning, and strive to agree on which original elements are no longer suitable and how to replace them.

Pina e Cunha et al. (2019) suggest that organisations that want to continue their functioning in the case of extreme dynamic complexity use imagination, ingenuity, and new modes of functioning. In such a dynamic and complex situation, there is no time to observe, analyse, and plan. When the context is quickly changing, traditional methods are not necessarily entirely useful; however, continuous functioning remains important. Improvisation is a response to an unexpected or unplanned event, and is a crucial element of an organisation's functioning in changing circumstances. Furthermore, improvisation can be learned and improved through practice, and has the potential to become a routine.

Frykmer et al. (2018) add similar thoughts to the discussion. According to them, complexity is a characteristic of disaster response that requires the organisations to be ready for the unexpected and be able to adapt to new situations. It is frequently necessary that the organisations that respond to disasters rely on improvisation. Improvisation is in essence a tool for functioning in uncertain circumstances in which the preconceived plan is not useful or is of limited use.

Mendonca and Wallace (2007) believe that decision-makers ought to be ready for improvisation. Organisations could make better plans and respond successfully to disasters if they learn from previous improvised actions, especially if they understand the cognitive processes of improvisation. Disasters bring about a lot of unusual situations that require from leadership almost simultaneous preparation and execution of new plans.

Table 1 Typology of improvisation

Organisational improvisation	Performed by formal institutions or organisations, based upon plans, preparations, procedures and solid resources
Reproductive	Reproduction of destroyed or disturbed element of the system
Adaptive	Re-shaping of an element of the system in order to make it useful
Creative	Creation of new element of the system needed to address unplanned challenges
Emergent improvisation	Performed by emerged, informal and spontaneous actors, using their knowledge, experiences and provisional resources
Combined improvisation	Performed by organisational and emergent actors in concert

Source: Wachtendorf and Kendra (2005) and own presentation

Organisational theory often treats improvisation as a phenomenon that should be limited. For instance, Alexander (2020) believes that, in essence, emergency management is composed of three key elements: plans, procedures, and improvisation. Plans form procedures by foreseeing basic needs and crucial means of fulfilling them. That should reduce improvisation to a necessary minimum, and failure to constrain improvisation is regarded as negligence. Kreps (1991) argues that improvisation means organising during the event whereas preparedness means organising before the event. He prioritises preparedness over improvisation. Drabek (2001) also emphasises the need for planning to reduce the incidence of improvisation. However, the latter is not avoidable during a disaster.

On the contrary, Wachtendorf and Kendra (2005) believe that improvisation is not a problem of the system. Organisations function in dynamic and changing environments where unexpected situations are frequent. The very nature of disaster suggests that the circumstances surpassed coping capabilities of affected communities and organisations. Organisations are more resilient if they are able to envisage changes in the environment, to develop planned courses of actions, and to demonstrate adaptability and the ability to improvise under time pressure and in difficult situations.

2.3 Improvisation of emergent actors

It is important to reiterate that improvisation does not refer only to formal organisations but also to emergent actors. Emergent groups and individuals are named ‘zero-order

responders' and are defined as "a subset of surviving victims who are on the proverbial frontlines in combating the unfolding consequences of a […] disaster" (Glantz and Ramirez, 2018, p.4). Spontaneous disaster response through self-organising of emergent volunteer groups and individuals is a usual characteristic of disaster response. The forms of their functioning range from search and rescue, transportation, and delivering of rescue equipment, to provision of food and drink to victims and emergency workers (Twigg and Mosel, 2017).[3] However, these actors are rarely included in formal disaster response planning and provisioning humanitarian help. The importance of such help is gaining momentum since the vicinity, speed, efficiency, responsibility, and empowerment of local inhabitants and groups enable them to significantly contribute to providing disaster-related help. As a matter of fact, disasters require spontaneous reaction of emergent actors, often before the activation of formal organisations. Glantz and Ramirez (2018) also believe that survival tactics taken by 'zero-order responders' before official first responders arrive at the disaster site are potentially useful. Tyszkiewicz (2017) argued that small groups of people help one another when lives are threatened in events like accidents, conflicts, and disasters. Groups demonstrate collective creativity, and surprising solutions are discovered instantly.

Emergent activities of rescue and help are based on improvisation and creativity, and are not burdened with bureaucratic procedures; consequently, they are more adaptable even though they are less stable. Groups form quickly and dissolve quickly. Moreover, the activities of these groups change according to needs, 'membership' is under constant change, and leadership is not clear. Also important is that emergent groups are more inclined towards short-term decision-making rather than long-term planning (Twigg and Mosel, 2017).

It is necessary to emphasise that spontaneous volunteer disaster activities could produce certain difficulties and challenges. Twigg and Mosel (2017) listed a few: a potentially huge number of people, equipment, livelihoods, and vehicles at the disaster site; the issue of coordination and communication among numerous and various actors; volunteers who are not used to the official decision-making process; learning and obtaining experiences during a process itself; the issue of lodging, nutrition, and clothing (protective uniforms) of volunteers; damage, injures, or even death of volunteers; lack of equipment and skills; and, last but not least, the issue of legal accountability of volunteers due to the fact that their activities might cause deaths, injuries, and damage to those who are being rescued and helped.

3 Review of recent research

The phenomenon of improvisation has attracted the attention of researchers in recent years. The findings emphasise the importance of improvisation in achieving effective emergency responses; however, those responsible for crisis planning insist on promoting a highly centralised command and control approach to crisis response. According to Webb and Chevreau (2006), such an approach discourages creativity to successfully cope with disasters. Tierney (2012), too, is critical towards this command and control thinking, which is focused on centralised information processing and decision-making, establishing authority and hierarchy, and neglecting on-the-ground information sources, local expertise, and improvised action; meanwhile, it is preoccupied with rules and procedures.

Moynihan's (2009) research findings on the ICS's role in several disaster response cases in the USA revealed that the incorporation of emergent actors and the identification of their capabilities was a huge problem in all cases. However, as Jensen and Thompson (2016) suggested, the level of incorporation of emergent volunteer actors is one of many factors that impact the success of the ICS in disaster response.

Hurricane Katrina, which ravaged the Gulf of Mexico in September 2005, is a notorious case of poor disaster management. Not only were planned activities of **institutions and organisations** either inadequate or absent completely, this case demonstrated poor improvisation, as well. Wachtendorf and Kendra (2006, p.1) believe that the lack of improvisation at the organisational and multi-organisational level appears to be closely related to some failures of the overall response to a disaster. Two main reasons for shortcomings in the response of organisations and citizens to the Hurricane Katrina seem to be "a significant hesitancy to act" and "an inability to develop shared understanding of roles, responsibilities, capacities, and the dire circumstances citizens were encountering" (ibid.).

However, there was one positive set of activities that involved a significant amount of improvisation: the water and airborne search and rescue operation that the US Coast Guard exercised in the area of New Orleans. Coast Guard personnel rescued people trapped in attics, clinging to floating debris, or marooned for days without food or water on rooftops. They managed to rescue over 22,000 inhabitants, which exceeds the number of people they rescued in the last 50 years. Their action was flexible, with numerous modifications compared to routine everyday work, and focused on simply helping people in need. They were concurrently supported by an "emergent and ephemeral flotilla of civilian boat operators who acted on their own or heeded a call from political leaders" (Wachtendorf and Kendra, 2006, p.2). Coast Guard and emergent groups acted autonomously, relied on their experiences and versatile training, and shared a common vision of what needed to be done; all together, these characteristics made this case of improvisation possible and successful.

To prove the important role of improvisation in disaster management, Kendra and Wachtendorf (2006) assessed the World Trade Center terrorist attack response. On the morning of September 11, 2001 officials of the Office of Emergency Management were in the Emergency Operations Center located in the building adjacent to the Twin Towers; hours after the collapse of the towers, the Emergency Operations Center collapsed as well. The team needed a new site of central coordination, and this became the Police Academy's library. Several days later, the operations were moved to a large shipping pier along the Hudson River.

Kendra and Wachtendorf (2006) point out another case of organisational improvisation during the same event. It was related to the process of credentialing. The involvement of numerous local agencies and volunteers, and people and organisations from across the country, required altering the original protocol of credentialing system to limit the number of personnel in secured areas. The system that allowed everyone with an agency badge to enter the site of the terrorist attack had to adapt to the current circumstances. Tierney (2012) adds that there was large-scale improvisation where emergent multi-organisational networks were established. Concurrently, debris management was introduced and forensic investigations were taking place under unique circumstances, i.e., a devastating terrorist attack.

On the other hand, Deterala and Villar (2019) exposed the negative case of the Costa Concordia disaster where 30 people died due to improvised response team actions that significantly digressed from official disaster response protocol.

Pro-social behaviour predominates in disasters, and many disaster-related problems are solved through **emergent individual and group actions** without the involvement of formal organisations or institutions. One of the most known cases in this millennium was the waterborne evacuation of lower Manhattan during the 9/11 terrorist attack, where several hundred thousand people were evacuated via a spontaneous fleet of vessels to Staten Island, Brooklyn, and New Jersey. After disembarking evacuees, the boats carried supplies and rescue workers to the site of the attack. This case of creative evacuation involving towboats, dinner cruise boats, tour boats, yachts, and other vessels lasted for several days (see more in Kendra and Wachtendorf, 2016).

Tierney (2012) reports on some successful actions of emergent individuals and groups, such as the evacuation of passengers from a burning plane in Toronto in August 2005, similar actions in a similar circumstance in Okinawa in August 2007, and search and rescue during the Great Tohoku Earthquake in Japan in 2011, which caused a tsunami and nuclear disaster and where half a million volunteers became active in the impacted regions.[4]

Tyszkiewicz (2017) documents how small groups of people improvised during disaster and helped each other. She points out the case studies of the 2013 typhoon Haiyan that hit the Philippines and the 2012 super storm Sandy in the USA, where small groups connected with each other and found innovative and effective solutions to urgent problems.

Twigg and Mosel (2017) introduce the case of the 2015 earthquake in Nepal. In Kathmandu, local inhabitants were the first to exercise rescuing, pulling out of debris family members and neighbours, pitching tents, providing food, delivering rescue packages (when they arrived), and organising the collection of financial help via the internet. After the 2004 tsunami in South-East Asia, the key role in rescuing, burial of dead people, and provision of food, water, and clothes was played by individual inhabitants of local communities. Official help arrived at the disaster sites one to five days after the disaster.

During the 2005 floods in Mumbai, citizens provided food, water, medicines, and temporary shelter to affected people; they also prepared sand bags, and by doing so took some of the burden off the shoulders of official responders who could then devote their time and energy to more specialist tasks. Some volunteers performed more demanding actions, such as the establishment of communications and making business possible after the disaster. In a similar vein, after the earthquake in Bam in 2003, volunteers assisted in the psychological recovery of the affected population (Twigg and Mosel, 2017).

4 Improvisation during disaster response in Slovenia

In Slovenia, the response system[5] is frequently challenged by disasters.[6] To what extent has the recent disaster response been characterised by improvisation? In this paper, we focus on the improvisation of both organisational (official) disaster response actors and emergent (spontaneous) actors (Table 2).

The 2003 wildfire in Kras destroyed the natural environment and threatened some villages. At the time, legislation did not adequately address large-scale fires, and there was no state firefighting plan to deal with them; therefore, firefighter commanders at the regional and state level had to improvise to activate firefighting units from other regions. They contacted regional and municipal commanders and requested additional personnel. Since such assistance was not stipulated by legislation, there arose the question of how to cover the costs of firefighting units from unaffected areas. Namely, the costs were too big, and two of the affected communities could not afford them due to budget constraints. As a consequence, all firefighting organisations from outside areas made the decision to cover their own costs (Klarič, 2019).

Furthermore, firefighter commanders had only basic knowledge of staff leadership and limited experience. There were no adequate plans for the activation, functioning, and leading of firefighting units during large-scale interventions. There was also no adequate technical support for leadership (including the absence of detailed maps of the affected area). Consequently, firefighting officers who assumed intervention command had to apply improvisation based on past experiences. They were successful (Klarič, 2019).

As mentioned before, the bulk of the firefighting system in Slovenia is comprised of voluntary fire brigades who are organised and trained. Nevertheless, emergent individuals join these firefighters and help them during large-scale fires. In 2003 wildfire, some emerged volunteers were seconded to firefighting teams while some operated behind the scenes, providing logistical and communication support.

Flash floods in Železniki in 2007 caused three deaths, substantial material damage (water flooded more than 350 houses and damaged more than 150 cars), and huge infrastructural havoc. This disaster also stimulated improvisation due to inconsistencies in threat assessment and the absence of municipal protection and rescue plan in the case of floods. There were also difficulties caused by unrealistic regulations that were eventually circumvented by the activities of experienced civil protection personnel. Our analysis reveals a rather notable improvisation of the then national civil protection commander and his collaborators, which contributed to the prompt and effective response to the disaster. This is evident with the integration of management levels: an *ad hoc* operational group composed of local and national Civil Protection representatives was established to successfully coordinate intervention teams. This solution also made possible solid operational leadership and work in unpredictable and changeable circumstances. The activation of protection, rescue, and relief forces did not take place as envisaged by procedures; however, due to successful improvisation, the response was quick (only a few hours after the flood wave) and effective (Šlebir, 2019).

In this particular case, many spontaneous volunteers were involved in the disaster response. It was a challenge to organise all of them and assign them to tasks. The operational group formed an entry point for volunteers in order to identify them, give them tasks and instructions, and escort them to a specific sector of the disaster site. Volunteers were mainly used as labour helping firefighters (Šlebir, 2019).

The storm in Kamnik in 2008 fell trees, devastated roofs, cut electricity and telecommunication installations, and flooded roads, making them temporarily useless. The improvisation started even prior to the disaster when municipal leadership, spontaneously and outside legal framework, formed an on-call service and established a data collection process. This enabled more effective management of the disaster response when it occurred. Municipal leadership also formed logistic and administration teams using better trained firefighting personnel instead of civil protection members,[7] which

contributed to the teams' efficiency. During the response itself, the municipal leadership improvised and formed a special coordination body for the most affected settlement (Jeraj and Vavpetič, 2019).

Spontaneous volunteers, individuals, organisations, and entrepreneurs using their own equipment were involved in removing fallen trees, cleaning roads, repairing roofs, etc. It is interesting to note that the affected people's relatives, work colleagues, and even political party acquaintances from other parts of the country came to help them. Special coordination of these spontaneous volunteers was not established, they were only identified upon their arrival at the disaster site. There was also spontaneous help in terms of monetary and material donations (Jeraj and Vavpetič, 2019).

Floods caused by prolonged rainfall in 2010 in the Ljubljana region impacted dozens of buildings and potable water pumps, and damaged infrastructure and agricultural and suburban areas. Before the disaster, the Civil Protection Staff of the Municipality of Ljubljana was organised according to all regulations but the municipality wanted to reform it according to ICS standards. Individual staff members were assigned to tasks such as the coordination of rescue services, planning, logistics, administration, and finances. Although the reform was not concluded by the time of the disaster, on the third day of the disaster, the civil protection commander and staff members agreed to follow the above-mentioned responsibilities. This reorganisation brought about some problems, among them a lack of personnel and offices, and lack of information–communication support. The improvisation was based on the experiences of staff members and not on training for this particular way of operating (Kus, 2019).

All commanders, their deputies, and their staff members passed introductory and basic training, and some of them obtained additional knowledge through training abroad or regular work.[8] This knowledge was too general, and consequently there was a lot of improvisation during their disaster response. Improvisation was observed in the following tasks: delivering sand bags to affected inhabitants, forming a special coordination group for one affected area (Barje), coordinating work with the Slovenian Armed Forces,[9] involving inhabitants in problem-solving, gathering information about the problems faced by inhabitants, and creating of a new means of communication with the affected population (face-to-face meetings and notifications, and contacts with inhabitants' representatives) (Kus, 2019).

In this case, although volunteers were involved in the disaster response, most were not spontaneous volunteers. They came from various organisations that signed contracts with the Municipality of Ljubljana to offer their services in the case of a disaster, and therefore their involvement in the response system was formal. They served as volunteer firemen, scouts, radio hams, speleologists, Red Cross members, etc. The Red Cross provided psychological help to some heavily affected people. Similar contracts were signed with some enterprises to provide food, construction services, equipment, and tools (Kus, 2019).

Sleet in 2014 affected approximately 80% of Slovenian municipalities. Two people died during the disaster response, and huge damage was sustained by forests, agriculture, and electric and information communication technology infrastructure. Slovenian authorities did not have a plan for sleet, and therefore they improvised and used the flood plan. One municipality (Logatec) exposed the problem of communication between local authorities and regional/national disaster response structures. The latter should help or at least coordinate the response. Municipal authorities improvised to establish alternative communication channels by direct contact with telecommunication operators and media.

They also organised a network of neighbouring municipalities to provide reciprocal help. As far as management was concerned, the municipal authorities replaced individual leadership with a collective leadership (Svete and Barut, 2019).

In the most affected municipality (Postojna), a special body, Crisis Staff, was established and functioned successfully to replace legally envisaged but ill-operating Civil Protection Staff. The mayor dismissed the civil protection commander and assumed the function of Crisis Staff commander himself. Concurrently, the deputy mayor was appointed as deputy commander of Crisis Staff. Crisis Staff assumed coordination of protection, rescue, and relief forces at the local level, assigned specific tasks to various structures, provided meaningful division of work, provided logistical support, and carried out campaigns to thoroughly inform the population about the disaster (Svete and Barut, 2019).

Local spontaneous volunteers were also involved in this disaster response. In Postojna they supported firemen, communal services, and social welfare services, and directly helped affected people. Spontaneous actors were coordinated and organised by the local Crisis Staff. In Logatec, spontaneous volunteers (mostly scouts) formed a centre where affected people, especially the most vulnerable ones, could get a warm meal and talk to volunteers. This had a positive social-psychological effect. Scouts were also involved in preparing food for rescue workers and inhabitants who needed it.

In 2017, the inhabitants of Slovenia witnessed three large-scale fires in hazardous waste storage sites. In the case of the fire at EKO Plastkom (Ljutomer), 38 voluntary fire brigades with approximately 500 firefighters were involved in extinguishing the fire. All official actors formed an operational staff at the site of the event, but did not convene as envisaged by the firefighting plan. They instead ensured that the flow of information in different directions was extensive and replaced the need to discuss matters within the operational staff (Novak, 2018).

Many enterprises, services, and emergent individuals were also incorporated in the response. Apart from them, a mass of curious people entered the disaster site, and it was very difficult to control them. These people were obstacles to intervention vehicles, and therefore the police had to remove them.

Table 2 Organisational and emergent improvisation in Slovenia

Disaster	*Organisational improvisation*	*Emergent improvisation*
Wildfire 2003	Changing the way of activating response forces; using leadership experiences in the absence of plan; covering costs in a unique way	Providing labour, logistical and communication support to firefighters
Flash floods in Železniki 2007	Integrating of management levels; composing an *ad hoc* operational group, activating response forces in a unique way	Providing labour in order to help firefighters
Storm in Kamnik 2008	Forming an on-call service and establishing a data collection process; forming logistic and administration teams using better trained firefighting personnel instead of civil protection members; forming a special coordination body for the most affected settlement	Removing fallen trees, cleaning roads, repairing roofs; donating money and material

Table 2 Organisational and emergent improvisation in Slovenia (continued)

Disaster	*Organisational improvisation*	*Emergent improvisation*
Long-rain floods in Slovenia 2010	Using ICS structure based on the experiences of staff members and not on training for this particular way of operating; forming a special coordination group; involving inhabitants in problem-solving; creating of a new means of communication with the affected population	Providing psychological help to heavily affected people; providing food, construction services, equipment, and tools
Sleet in Slovenia 2014	Establishing alternative communication channels; organising a network of municipalities; replacing individual leadership with a collective one; establishing Crisis Staff to replace Civil Protection Staff	Supporting firefighters, communal services and social welfare services; helping affected people; preparing food for rescue workers and some inhabitants
Large-scale fire at a hazardous waste storage site 2017	Circumventing firefighting plan and replacing Operational Staff meetings with the smooth flow of information between response actors	Incorporating some enterprises, services and emergent individuals in the response to disaster

Source: Own presentation on the basis of analysis of cases

5 Conclusions

Improvisation during a disaster is an adaptation of the response system to the dangerous, complex, dynamic, and changeable circumstances. Pre-established structures, planned actions, actors' competences, and resources represent a basis for decision-making in a crisis. Regardless of how comprehensive and realistic plans are, they cannot predict all possible disaster scenarios. Hence, the disaster response is most often composed of planned and improvised actions; the ratio between these actions varies from small deviations to profound imbalances. In addition to the organisations that are part of the response system, emergent spontaneous actors also perform improvisation.

The analysis presented in this paper allows us to answer the initial research questions about improvisation during disaster response in Slovenia. **Organisational improvisation** played an important role in the country's disaster responses. In two cases (flash floods and sleet) the absence of adequate plans forced actors to improvise whereas in other cases grave circumstances elicited improvisation. The explored cases reveal that organisations adapted how forces are activated and their functioning (flash floods), changed procedures (wildfire, floods caused by prolonged rainfall, storm, and sleet), established new management and coordination structures (flash floods, storm, floods caused by prolonged rainfall, and sleet), and modified existing operational modes and communication channels (storm, flash floods, and sleet). Hence, the improvised solutions ranged from minor adaptations of procedures to the establishment of new management structures. The improvisation was reproductive, adaptive, and constructive. The improvised solutions were based on plans (where available), and existing structures and resources. The fact that the actors were involved in the disaster preparedness process was key to their

creativity and effectiveness during improvisation. Improvised solutions also brought about new energy and motivation to solve pending problems.

Many civil society organisations composed of volunteers signed contracts with the state or municipalities and received financing from them. Consequently, volunteers were well embedded in the disaster response system; however, there were still **emergent, spontaneous individuals and groups** who provided help to victims, although to a lesser extent. The nature of explored disasters, i.e., no mass victims and a relatively small number of heavily affected people, also contributed to lesser involvement of spontaneous actors. Emergent actors were mainly seconded to firefighting units; they also provided logistical (preparing and delivering food, providing tools and social welfare) and communication support, and general labour (removing, cleaning, repairing, and constructing stuff). In some cases (sleet and floods caused by prolonged rainfall), these emergent actors also cared for and talked to those people most affected by the disaster, thereby providing them with basic psychological assistance. These actors emerged from both affected communities and outside them. They were rather well incorporated in the response system (combined improvisation) and coordinated.

The overall analysis permits implicit identification of factors that influence the success of improvisation in disaster response; however, this field demands further research. Organisations will probably improvise better if the system they operate in is not over-centralised, if jurisdictions of various actors are clear, and if society accepts (or perhaps even stimulates) improvised ways of problem-solving in general. Improvisation of emergent actors might benefit from values that limit selfishness in social relations and enhance the sense of belonging to the local community. A regulated legal status of emergent actors might be helpful, as well.

Acknowledgements

The paper is based on the findings of the research project "Formation of Comprehensive Disaster Response Model in Republic of Slovenia" commissioned by the Administration of RS for Civil Protection and Disaster Relief, and accomplished by a consortium of research institutions, disaster relief organisations, and individual practitioners under the auspices of the Faculty of Social Sciences, University of Ljubljana. The author was an active participant in the research. The author also acknowledges the financial support from the Slovenian Research Agency (research core funding No. 0206).

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Notes

[1]For instance in Slovenia, the National Firemen Organisation developed an Intervention Command System that very much resembles the USA's ICS.

[2]Perhaps an appellation better than 'creative' improvisation might be 'constructive' improvisation (in terms that the actors construct something new) because, as definitions and research findings suggest, creativity is the feature that permeates the entire process of improvisation.

[3]Emergent actors use their tacit knowledge to help disaster victims. Tacit knowledge is part of implicit knowledge that we cannot express in a written or verbal way. It is deeply rooted in the individual, in their deeds, experiences, ideals, emotions, and values (comp. University of Ljubljana, 2020).

[4]However, it seems that Japan's centralised and over-organised system of disaster response, bureaucratic rigidity, and fear of individual officials to send bad news to superior authorities, contributed to the lack of organisational improvisation (Malešič, 2012).

[5]Disaster response system in Slovenia is comprised of Civil Protection Staffs and units, medical care service, social welfare service, state and local bodies, various companies, non-governmental organisations (speleologists, divers, scouts, dog breeders, Mountain Rescue Service, humanitarian organisations etc.), and volunteer firefighters who are the bulk of the system (133,065 members in total). Among them are those with operational skills (approximately 47,000) who are organised in 1363 firefighting societies, 120 firefighting associations, 17 regions, and the Firefighting Association of Slovenia. Professional firefighters are part of the system, as well however, their number is relatively small: approximately 950 in total (Malešič and Jeraj, 2018). The disaster response system is organised at state (including regional) and local levels. When the system is overwhelmed by disaster consequences, Slovenian Armed Forces can be activated, as well to help the affected population. Civil protection commanders are authorised to coordinate disaster response.

[6]A review of the journal Ujma, which is published annually and analyses disasters in the previous year, suggests that Slovenia experienced more than 50 relatively big disasters in the period of 2003–2019: mostly floods, storms with strong wind and hail, droughts, wildfires, and industrial fires, but also an earthquake and a sleet storm.

[7]Serving of citizens in Civil Protection is obligatory by law in Slovenia.

[8]As a matter of rule they are not professionals in the field of civil protection.

[9]The Slovenian Armed Forces are frequently involved in disaster response (Malešič, 2015). There are six disasters included in our sample, and SAF participated actively in four of them (wildfire, flash floods, floods caused by prolonged rainfall, and sleet).

Website

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