Management and Administration Doctoral School

COLLECTION OF THESES

for the PhD dissertation

Decision-making of firefighting managers in emergencies

of Ágoston Restás, PhD

Supervisor:

Prof. Dr. Zita Paprika-Zoltay
University Professor

Budapest, 2012

Department of Decision Theory

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1 Research precedents and the justification of the topic

1.1 Timeliness of the topic

The increase of requirements against decision-makers is a natural inherent feature of our economic development. Recent research achievements explain the decision mechanism in emergencies unlike previously, so it is useful to examine this topic in the context of firefighting managers as well.

Decision theory as a branch of organization and management sciences has merely a few decades of research history. The coercion of the risk reduction expectations of business spheres significantly facilitated its becoming a separate science. Therefore, decision theory primarily examined fields, where a decision-maker had by far much more time to make his long-range decisions than a firefighting manager coming under decision compulsion in minutes. Naturally, neither are the case maps or the circumstances similar, so the decision-making mechanism cannot be identical either.

Considering the above, it is quite obvious that decision theory mainly investigates the decisions of economic mechanisms being an integral part of our everyday lives. My observations show that also the training of decision-makers for emergencies exclusively involves the examination, teaching or instruction of conventional decisions. Having scrutinized the different levels of training of the military, the Police, disaster managers and firefighters, I noticed that organization, management and decision theory issues constitute a part of the teaching topic in all cases, however, each issue only intends to transfer the classic organization, management and decision theory knowledge, following the traditional trend, and only contains information, haphazardly or tangentially, which highlight the decision theory background of the operational and tactical tasks of those in emergencies.

The background of decisions made during operational and tactical missions is mainly made up of rules of procedure, which, obviously, grant a great assistance, however, they do not show the true mechanism of decisions made in such situations. Considering the consequence that the decisions made in exceptional situations, insisting on conventional procedures, may also be even dangerous, I am convinced that the study of emergency responders' decision mechanism is very much justified.

1.2 Delimitation of the topic

Depending on the interpretation range of an emergency, a decision-maker may feel a kind of constraint before any decision. This is, of course, completely different if it is only about our daily routines, pleasant consequences or the improvement of our way of life. However, the majority of people face, from day to day, constraints of entirely different meaning and nature. These constraints are mainly independent from their own will, meaning the toleration, avoidance or termination of some undesirable issues. The interpretation of the term ‘constraint’ gains an ordinary meaning here.

Further studying the term ‘constraint’, we can find a segment, where one or more persons, or things that may be closely attached to them, find themselves in a situation or state, from where, based on their own capabilities, more or less, they are no longer able to break free on their own accord. The intention to terminate the negative state is unambiguously desirable; therefore, it is closely and logically linked to *time*. Resolving other people’s tight situations and reaching the desirable – at least neutral – state is an obvious constraint from the part of the person granting assistance as well.

Therefore, I regard all those who perform the improvement of a given state or of the situation of persons, as a profession or occupation, under the pressure of time, as emergency responders.

Based on the above, from the aspect of my dissertation, I consider the persons below emergency responders:

- military decision-makers in war or under exercise circumstances;
- fixed or rotary wing aircraft pilots and air traffic controllers;
- police personnel performing operational or covert actions, hostage negotiators;
- first aid personnel, physicians performing surgical interventions or working at casualty surgeries;
- finally, those in the field of disaster management and firefighting, who intervene on an operational or tactical level, authorized by law, and perform command and control tasks; namely firefighting managers and incident onsite commanders.

Despite the fact that the profession or occupation of the above decision-makers is closely linked to emergency decision-making, the topics and specialties of the individual branches

may stand so remote to each other that their joint or detailed discussion – also because of the extent of the dissertation – would not be possible.

Due to the above, I have logically narrowed the target group of emergency decision-makers to one that, on the one hand, well shows the peculiarity of decisions made in such situations, I have my own experience on it, on the other hand, which may make my message authentic and my achievements valid from the side of practice.

During my previous career, I performed my duties as a helicopter pilot in the Hungarian Defense Forces; later, in the organization of the fire service, I fulfilled different positions. **Thus I did not only see the decision-making of military decision-makers, the controllers of helicopter pilots and firefighting managers as an outsider, but I myself actively participated in these processes. Therefore, I have primarily drawn on the lessons learnt from the decision-making mechanisms of the above three professions in my dissertation in a way that I have intended to focus predominantly on the decisions of firefighting managers.**

2 Research objectives and the methods used

2.1 Research objectives

During my researches, I have set as objectives the following issues:

1. Study the processes of classic decision-making, assess their opportunities and define and justify their limitations;
2. Study the emergency decisions through specific examples, draw conclusions from them and explore the relationships;
3. Set up hypotheses and perform a survey with a group of persons that can be involved in firefighting management to examine them to determine the peculiarities of the decisions;
4. Identify the circumstances and peculiarities of emergency decision-making;
5. Examine the procedures making emergency decisions more efficient, draw conclusions from them and explore relationships;
6. Set up models to understand the emergency decisions of firefighting managers;

7. Formulate the results of the lessons learnt and relationships in form of recommendations, and facilitate their utilization in the initial and advanced training of disaster managers and fire safety experts in Hungary.

2.2 Research hypotheses

In order to fulfill my achievements and to define the trend of my research I have set up and scrutinized four hypotheses. The first one of them concerns the relationship between the field of decision theory researched at present and emergency decision-making.

Based on my hypothesis, a method of division of decision-making mechanisms can be established, in which the rules of conventional analogous thinking do not suffer a breach, but the decision-making mechanisms on the periphery of the research fields of decision theory, preferred at present, receive a standard role and parity, so, explicitly the emergency decision-making of firefighting managers as well.

My second hypothesis is linked to the decision theory knowledge of firefighting managers, based on the scrutiny of firefighter students studying at higher education establishments. ***Based on my hypothesis, the students will give account of the diverse store of learning, but I exclude the possibility that they would provide complex answers or solutions to the interrelation of special decision-making, characteristic of their work, considering the framework of institutionalized training.***

My third hypothesis relates to the practical observation of firefighters, i.e. how often-repeated activities influence their decisions. ***Based on my hypothesis, the cornerstones of practical observations will be outlined as a result of the study, and all the factors will be conceived, which would influence or limit their decisions the worst.*** I regard it as a clear achievement if *emergency* or the category in relation, i.e. *limited time* in an everyday sense, emerged predominantly.

My fourth hypothesis bears relation to the orientation of task performance of emergency decision-makers, which I intend to study, utilizing a control group, with a word association method. ***Based on my hypothesis, the division of answers of firefighters demonstrably shifts***

compared to the answers of the control group, i.e. it is overrepresented towards intervention. Based on my assumption, the division of answers of the control group is identical amongst the identified categories, or will show a very similar division, perhaps slightly underrepresented towards intervention.

2.3 Research methods

In order to achieve my research objectives, I have used the main research methods below:

- I have compiled an individual study and research plan, so that they support me the best to achieve my scientific objectives;
- I have studied the relevant chapters of Hungarian and international literature in connection of my theme, publications, studies, manuscripts and the results of the latest researches;
- I have participated in Hungarian and international professional fora, study tours and conferences, where I also delivered lectures besides gaining experience, and exchanged opinions with other researches and practical experts;
- I have collected information on other nations' observations, theoretical and practical achievements;
- I have led consultations with top researchers and experts representing this specialized field;
- I have carried out purposeful searches in libraries and databases in IT networks;
- I have systematized my knowledge attained during my career, my observations made as a firefighter and pilot;
- ***I have performed analyses from essays freely compiled by a group students***;
- ***I have compiled a self-designed questionnaire, with the help of which I have carried out a word association survey***;
- I have elaborated the results of my survey and drawn conclusions from them, which I have transferred into practice [recommendations], depending on opportunities, and I am using them [teaching].

The dissertation shows my personal observations in numerous places and also the background of their evolvement and consequences. I am convinced that the emphasized role of my personal observations enriches the dissertation and thus makes it even more authentic. The

application of my observations to underpin and perhaps debate the message in the literature used and the achievements of my own surveys, is not only of identical value, but may even mean more than the lessons learnt from interviews made with colleagues having similar experience and thus regarded as unbiased, referable according to general customs.

3 Summary of the achievements of the dissertation

I have justified the selection of my topic and its timeliness in the introduction of the dissertation. I have chosen the topic “firefighting managers’ decisions” from the topic of the interpretation range of emergency decision-making. I have identified my research objectives, set up hypotheses and selected the main research methods, with which I intended to achieve my objectives.

3.1 Establishing a decision matrix

In chapter one of the dissertation I have given a short overview on the genetic relationship between decisions and actions. I have pointed out that during the evolution of man, in the beginning, our actions and decisions had not been separated from each other in time or just slightly, they had been instinctual and served the immediate satisfaction of needs. This has radically changed during evolution, the decisions have become conscious, they have diverged from actions in time; in the following, they have been determined by farsighted care.

I have also pointed out that during history, strategists had shown through numerous examples the general military applicability of emergency decision-making; they, after the start of the battles, changed depending on the situation. It was only possible to preplan them in a limited way or it was completely impossible, however, their future impacts could become even an epoch-changing instrument.

In my dissertation, I have reviewed some of the stations of approaches of classic decision theory in chronological order, e.g. the models of *economy*, *administration*, *strict confirmation*, *gradual proceeds*, and *organized anarchy*. The trend of the overview was designed by the extent of rationalism of decisions, gradually quitting which one can reach the model of regulated anarchy from the exclusivity experienced in classic models.

I assume that the mechanism of decisions can also be divided in a way, which ensures the raison d’être of emergency decision-making. To justify my hypothesis I have created

a decision matrix, in which I have taken the future impact of decisions and the time spent on it as a basis. Thus, I have arrived at 4 fields, each describing a characteristic decision type: *classic, bureaucratic, routine* and *recognition-based decisions* (figure 1).

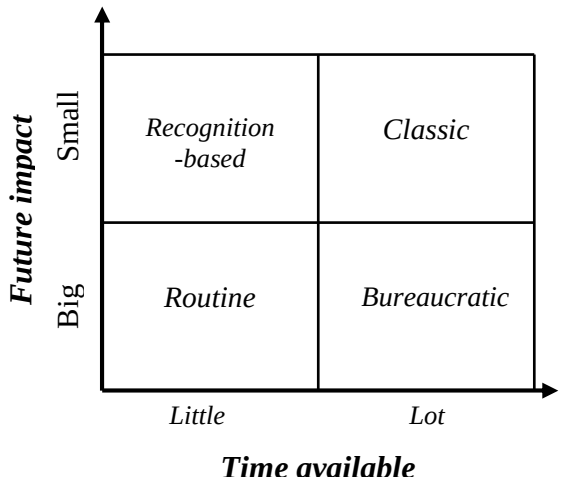

Figure 1: Decision matrix in the context of time available and future impacts
Source: Author.

3.2 Conclusions drawn from the activities of emergency responders

In the first part of chapter two of the dissertation, **I have elaborated and analyzed the function "damage value–time" in a decision-specific context.** Based on the analysis, I have proven that the objective of a decision professionally more efficient is not self-purposed, it is instead it means a true value-making "investment" for the society (*creating saved/rescued value,* and *reducing damage value*).

In the following I have explored how essential the difference is between professional efficiency and efficiency from an economic aspect, furthermore, that the present system handles decision-making as a static fact and does not take its role into consideration influencing the outcome of an intervention. Based on my conclusions, if we are able to apply the instruments available to more advantageous decisions in a professionally more efficient way, i.e. reducing damage value and increasing saved/rescued value, it is logical that we are able to increase the extent of economic efficiency. In other words, **the decisions of firefighting managers are not static; they are dynamic factors significantly influencing efficiency from an economic aspect.**

After the above, I studied the process of firefighting based on the *Rules of Firefighting*[1] in effect at the time of the research. **I have ascertained that the Rules comprise the practical observations professionally crystallized during many years in a logical structure as cornerstones.** I referred to the limited status of the possibilities of simultaneous information processing, this **I pointed out that the logically built structure of the Rules does not only simplify decision-making, but its *items also provide guidance* to implement the necessary order of procedure.**

As a whole, the provisions of the Rules do not hinder the decision-making of firefighting managers; on the contrary, they facilitate and promote it, making it possible to continuously utilize its decision-making capacity.

I have divided the subchapter dealing with the training of emergency decision-makers into three parts: first, **I pointed out the peculiarities of the *working environment* of decision-makers**, how complex and complicated they are. Second, I studied the *quality of training* for the tasks to be implemented in this special working environment. Based on this, **I have ascertained that the *peculiarities of the decision-making* are not dealt with adequately either in Hungary, or in the international environment studied.** Finally, I have come to the conclusion, based also on my own observations, that no adequate training is carried out on the features of the mechanism of emergency decision-making from a management theory or decision theory aspect in different specialized fields. They are experienced during practical life, and then automatically applied. **Another conclusion of mine is that, on the one hand, automatism surely facilitates our fast decisions even at a time when we are not really aware or cannot be aware of it; on the other hand, just this well (and automatically) functioning assistance results in the fact that the peculiarities of the decision-making mechanism are not to attract more attention**.

In the following subchapter, I have pointed out that the entire headway of classic decision-making mechanism can be justified through the topics of the teaching material studied, the exclusive strategic aspect of higher command training, the use of decision support systems proliferating on all decision levels and the aspect of operations planning imbedded in the military doctrines.

[1] Minister of the Interior Decree No. 1/2003. (I. 9.) on the Rules of Firefighting and Technical Rescue Activities of Fire Brigades

Despite the above, I have illustrated through examples that modern decision support systems are able to cause very serious mistakes; therefore, it is expedient to examine the mechanisms of emergency decision-making, well functioning surely since millennia, to understand them more substantially and utilize the opportunities lying within.

3.3 Achievements of the researches made based on my own surveys

In chapter three, I have set up hypotheses, then I continued my self-designed studies; first, I analyzed essays made and freely explicated by firefighters. Based on my observations, discussed in previous chapters of my dissertation and previous ascertainments on the education of management theory and decision theory of the specialized field, I assumed that the **students would give account of the diverse knowledge relating to decision theory, but I excluded the possibility that they would give complex replies or solutions to the interrelations of special decision-making, characterizing their work.**

Based on the essays, I have proven that firefighters exactly realize their peculiar decision-making situation: they must make the decisions, compelled by time, even if its appearance greatly differs in each essay. Despite this fact or in other words, exactly due to the significant differences it is obvious that they cannot conceive a uniform picture or provide a satisfactory explanation on its real background. **The above have proven my hypothesis, according to which the learning store of the students is quite diverse, however, they are not aware of the interrelations of specials decision-making, characterizing their work and its background.**

Using the well-known rules of my own observations and the fixation of the practical activities many time repeated, I assumed that the **cornerstones of practical observations would be outlined from the content of the essays, and all the factors would be drafted, which would influence or limit their decisions the worst possible way.**

As primary aspects of interventions, all of them unambiguously identified *life-saving*, but clearly dominant are also *safety*, *professionalism*, *specialized knowledge*, *experience* and *routine*, and the concepts in relation. It is unambiguously clear that they regard as important the role of *knowing the local circumstances and "clairvoyance"* as well, the skill, through which they understand the site and the given situation. It is ostentatious how significant role is attached to calmness, with different expressions like *"cool head"*, which obviously refers to

the danger of the opposite. **The above clearly show the trend that all of them attach an important role to controlling issues, maintaining the decision-making capacity of decision-makers**.

As a summation of the above, I have ascertained that my hypothesis, based on which the cornerstones of practical observations can be outlined from the contents of the essays, all the factors are formulated, which influence the decisions of firefighting managers the worst or limit them. My assumption is that time has a sensibly predominant role, justifiable in each essay.

From the result of the analysis of the essays and provisions of relevant rules of law – **as a derived result – I have undertaken to formulate the principles of firefighting in a declared *manner*.** Proven that the first and foremost principle cannot be other than saving and protection *human lives*; having accepted it I have created a hierarchic system. I set as the most important task, after maintaining life-saving, *safety*, and of equal value, considering the orientation of organizational goals, efforts made to *protect property*. In the following line of the hierarchy, *professionalism* is the next one, which must surely fulfill, logically, the expectations of *being economical* as well. I regard it as of equal value with two latter ones the efforts made to avoid disproportionate deterioration of *health* or the *environment*. Principles, built up hierarchically, are in interaction, but I have not fixed their horizontal sequence on an identical level.

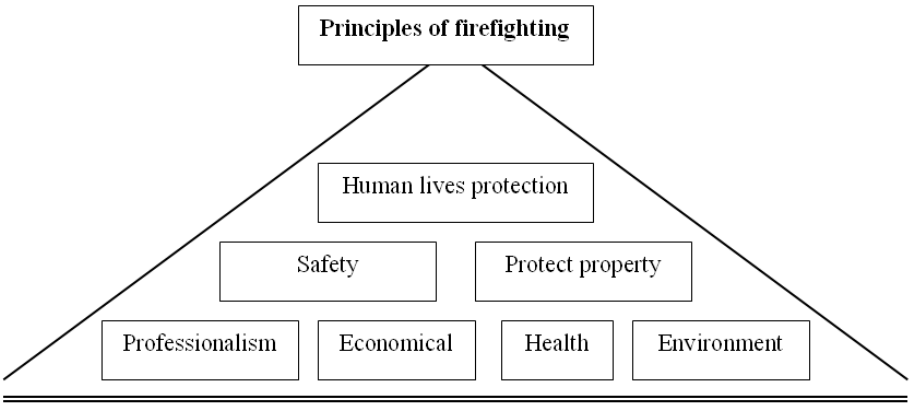

Figure 2: The principles of firefighting. Source: Author.

The rest of the chapter contains the description of the method of my word association surveys/tests, setting up of my hypothesis, the achievements and their assessment. The conventional method of association surveys uses '*one reply to one call word*', from which, using this method of mine, it only differed to the extent that I have also accepted several replies, moreover, I have explicitly requested it. By this I have achieved that, as an impact of the call word, a multi-storey set of thoughts has appeared, with the help of which I could compare, in a more complex way, the individual elements with the interpretation of the given incident, professionally accepting it as correct. By the way, they do not contradict the methodology of conventional surveys either, since the element, first described, logically satisfies the requirement that it reflects the idea appearing first. The use of the multi-element set of ideas was more advantageous, because through it I could receive a deeper insight into what is expressed in the first minute in the head of firefighting managers.

I have drafted a **nine-call word questionnaire**, through which it was planned to achieve the mental visualization of fires and incidents, professionally characteristic. **I sorted the replies** to the call words into **three groups: *neutral, characteristic and intervention***. The replies that were not insertable into the professionalism of a given fire or incident were transferred to the *neutral* group. The replies were acceptable in the context of the incident, with reference to the general professional characteristics of the incident, were transferred to the group '*characteristic*'. Strictly only those replies could be transferred to the *intervention* group that by themselves or together with further replies, have surely proven the professional elimination of the given incident, shown specific actions that may be brought into relationship with it and the trend of efforts to solve it. I have scrutinized the replies in two ways, in the beginning the first-word replies, later all of them together.

Based on my hypothesis, the division of the replies of firefighters shifts in the context of both the first and all the replies compared to the replies of the control group, demonstrably, i.e. overrepresented towards intervention. My assumption was that the division of the replies from the control group in the three categories showed identical or very similar division as the results of the first and all the replies, perhaps slightly underrepresented towards the group 'intervention'.

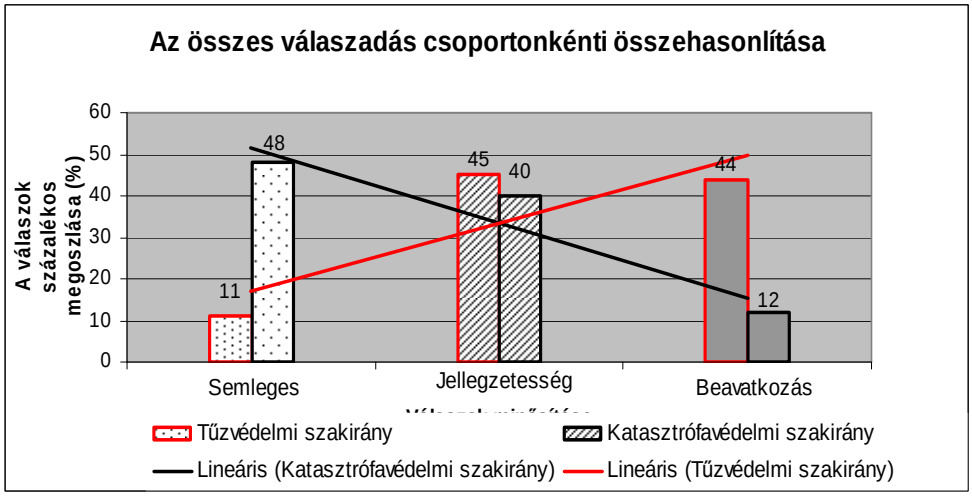

Chart 1: Comparison of all replies by groups. Source: Author.

Comparing the proportion of the first replies of the two groups, I have ascertained that firefighters primarily immediately focus on the *characteristics* of incidents on their solution (*intervention*), while at the control group, *neutral* features from a professional angle and general features (*characteristic*) are predominant. The replies from the group of firefighters, in the case of *all* replies, with a trend towards *intervention*, have become even more predominant.

Comparing the results of the *first* and *all* the replies of the control group, I have ascertained that *neutral* and *characteristic* replies have preserved their predominance, although to a reduced extent, but with a certain primacy of *neutral* replies. *Intervention*, facilitating the elimination of incidents, on the contrary, has doubled within the margin of error. I have justified with results received and the professionalism of replies that both the theoretical preparedness and the motivation of the students of the control group were suitable to make my methods used acceptable and its achievements authentic for the study of the decision-making mechanism of firefighters.

In the case of firefighters, the immediate replies have shown the predominance of professionalism (*characteristic* and *intervention*), which clearly increased towards thinking, facilitating interventions, with further replies as well. I could only interpret the above that firefighters focus, in the case of a fire, immediately on the possible, solutions, besides its characteristics, but even more, preceding them; call words referring to fire immediately *thrust* or *like a vacuum suck* their thoughts towards solution.

My hypothesis was that the division of the replies of firefighters, with regard to both the first and all the replies, demonstrably shifts compared to the replies of the control group, i.e. they are overrepresented towards intervention. I have unambiguously proven this based on the above through the absolute value of the results, their comparison to each other and the directions and dynamics of the trends.

3.4 Decision mechanism of firefighting managers based on recognition

In chapter four, I have demonstrated the working conditions of emergency decision-makers and pointed out the most characteristic factors like *complexity*, recognizable and well identifiable in all cases, the opportunity to *radically change* the given situation, the *uncertainty* and ambiguity of the information available.
I have demonstrated that the majority of problems could even be solved with adequate time spent on them, i.e. classic decision-making could resolve it with an analytical way of thinking and suitable resources, however, drifted by time, decision-makers do not have the opportunity to do so. This fundamentally influences and clearly limits the "planning" process of the implementation of the task, i.e. it must use a decision-making procedure based on a different mechanism.

I have demonstrated the general model of recognition-based decision-making, whose essence is that decision-makers have several, different solution patterns based on their previous experience, which they recall in a new situation and make their decisions based on it. During my own researches, I have proven, by analyzing the essays as well, that firefighting managers do not have enough time for analysis-based thinking involving the elaboration of options, to use the decision mechanisms based on them; therefore, recognition procedures are predominant in their decision-making.

I have proven with association studies that in the memory of firefighting managers, individual fires immediately generate thoughts relating to extinguishing them, thus solving the problem. Comparing with the results of the control group, I have unambiguously proven that the characteristics of fires and their solution options (e.g. life-saving, firefighting) are perfectly present in the memory of experienced firefighters, but also that its trend is strongly overrepresented towards solution. **It is obvious that the pattern characterizing a given fire calls forth the pattern of solution and it is predominant of the two.** Undoubtedly, I have

proven it with the clear high proportion of replies rated in the *intervention* group of the association surveys' results, on its own and also aggregated with the replies of the control group, rated in the same place.

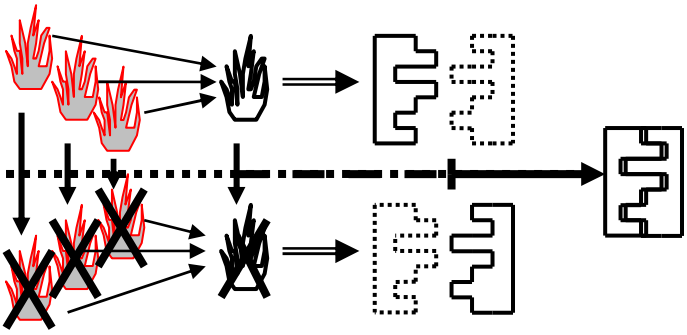

Figure 3: Pattern of fire and the joint pattern of the evolvement of the experience gained during extinguishing it. Source: Author.

Considering the limits of decision-making capacity and the fact that the ideas concerning the solution are usually in majority, **I have drawn the conclusion that firefighting managers are not merely interested in a fire itself or its features but much more in the process, through which they can terminate/extinguish it. It is shown that the mentality of firefighting managers, it uses, instead of the logical pattern *fire - characteristic - solution (firefighting tactics)*, an even simpler pairing *fire - solution (firefighting tactics)*.**

Based on the above, I have pointed out two essential elements of emergency decision-making: one of them is the use of a pattern, facilitating immediate decisions; the other one is the evolvement of the dynamics of the situation. The selection of the pattern, including future expectations, relating to the evolvement of the situation, is almost automatic for an experienced decision-maker; however, its correctness will be justified by a decision through the dynamics of the evolvement of the situation. **Based on the above, recognition-based decision is not only an individual act before starting to extinguish a fire, but also its continuous escort if needed. Thus, I am following the view, according to which experienced firefighting managers perceive a problem together with its solution, furthermore, I have extended the common and continuous existence of the problem and its solution to the entire process of the emergency as well [firefighting and technical rescue].**

At the end of the chapter, I have given an overview of the internal resources of the recognition-based decision-making like its background: *intuition*, *imagination*, *perceiving the invisible*, *ability to express oneself* and the use of *analogies and metaphors*.

3.5 Complex model of decision-making of firefighting managers

In this chapter, I have studied and demonstrated the mechanisms promoting a more efficient decision-making of firefighting managers. I have demonstrated the linkage possibilities between recognition-based decision-making procedure and analogous thinking, pointing out that the two do not exclude each other. If an intervention drags on or there is more time available to make a decision, firefighting managers can very often perform a more efficient firefighting using the latter.

If the time available is not adequate for analyzing and assessing decision-making, so recognition-based procedures receive a greater role. Critical analyzing thinking nowadays uses a recognition procedure, during which, with the help, of a quick test and depending on the time available, the decision-making process may be accelerated or made analyzable. The quick test avoids recognition-based decision-making, considering the conditions and sets critical analyzing thinking in the forefront. However, when the conditions are not suitable for the critical analyzing thinking, the quick test makes immediate reply possible.

Time limit, on several occasions, pre-excludes the possibility for the firefighting managers to perform analyses, necessary for a classic model. Therefore, for decision-makers, the selection of the optimum opportunity cannot be achieved unbiased. As a response to the difficulties of collecting information and reducing the costs involved, decision-makers do not strive to achieve ideal results, but, depending on the circumstances, settles for its satisfactory solutions.

By reducing the time available to make decisions or to maintain the decision-making capacity, firefighting managers use management [decision] on several occasions based on exceptions. Its essence, on the one hand, consists of the fact that certain moments of interventions go on based on protocols, so, it is not necessary to continuously control it; on the other hand, not all moments of the processes require direct control decisions.

During the study of creativity, I have come to the conclusion that, between features characteristic of it, practically there are no such ones that would not be advantageous for a VUCA environment (*vague*, *unsteady*, *complex* and *ambiguous*), describing the working conditions of firefighting managers for an efficient performance. Therefore, it is certain that the creative capabilities of firefighting managers may be explicitly advantageous to promote professionally correct decision-making on firefighting and rescue tasks, even if a significant part of the features characterizing innovativeness, otherwise explicitly unfavorable for daily work in structured organizations, in the context of firefighting managers, are intervention-free.

Heuristics are not incidental errors, peculiar thumb rules, facilitating our daily activities. These are the results of such simplifying mechanisms, through which decision-makers make complex tasks manageable for themselves. Besides the advantages of heuristics, erroneous distortions involved in them may mean the greatest challenges for firefighting managers, which sometimes help, but critiqueless adoption could mean a fatal hazard in certain cases.

In the last part of the chapter, based on the interrelations of the previous chapters, I have made attempts to create a model, demonstrating the emergency decision-making of firefighting managers. This declared objective and sense of the decision-making of firefighting managers is the efficient solution of emergency interventions. This is symbolized with the division of the principles of firefighting, in a structured division, on the top of which unambiguously, life-saving is.

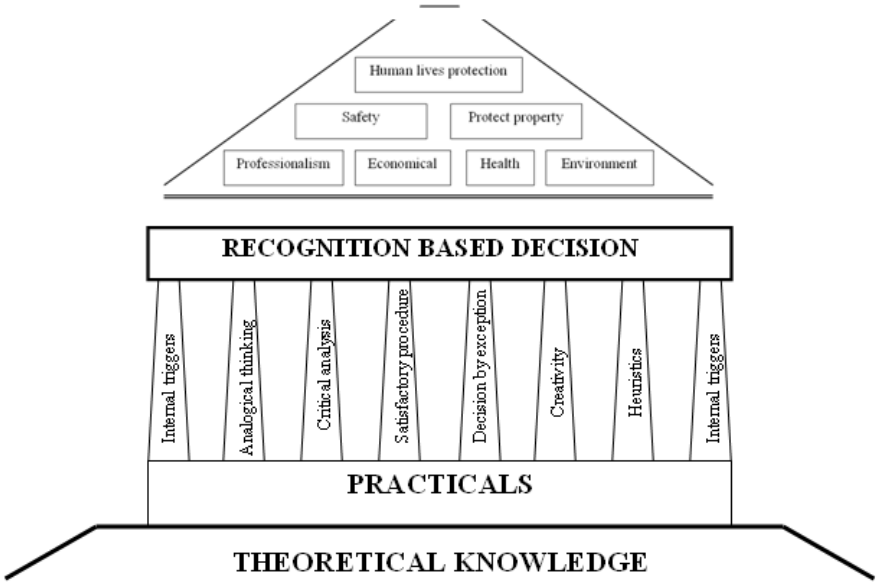

Figure 4. Complex model of decision-making of firefighting managers. Source: Author.

Firefighting managers, in order to make decisions, have surely less time than as there is for classic decision-making; so, due to the peculiar environment and the limited processing opportunity of simultaneous information, its decision-making mechanism is based significantly on recognition procedures.

A professionalism of firefighters relies on the unity of theoretical knowledge and practical observations. Built on practical observations, different mechanisms like *analogical thinking, critical analysis, satisfactory procedure, decisions based on exceptions, creativity and heuristics, together with the internal triggers* hold the recognition-based decision-making procedure of firefighting managers as pillars or make them functionable.

I illustrate the above as a complex system of emergency decision-making of firefighting managers in Figure *4.*

The research was terminated on 26 February 2012.

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