The Role of Hungarian Traffic Rules Education and Examination System – a Quality Function Deployment Approach

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Abstract: This paper examines the traffic rules education and examination system in Hungary, by using the Quality Function Deployment (QFD) method, as a new approach towards this complex topic. The education and examination of traffic rules are necessary for the stakeholders, but they have slightly different goals and objectives. This system has two separate stakeholders, the citizens and the authority, with their own set of goals, objectives, desires and ideas, about this system. The QFD reveals the connections between these layers. The paper analyses statistical data regarding road safety and presents the QFD model of both stakeholders and their inter-connections. The results of this work can be used to redesign education and examination methods, during the application of digitalized e-government solutions and as a general approach to match individual and public interests.

Keywords: Quality Function Deployment; Traffic rules; Traffic safety; E-government; E-learning

1 Introduction

In a perfect world, in a perfectly functioning state, all conditions and services are perfect. This means that citizens know and follow all the rules, the rules are perfectly designed, and citizens are physically and mentally able, for example, to learn and keep traffic rules perfectly. External conditions, such as the weather, are perfect and do not hinder this situation in any way. This situation only exists in an imaginary world, but the reality is far from that. In our study, we start from the suggestion of what is needed for road transport to work perfectly? This system has two separate stakeholders the citizens and the authority (Traffic Authority of Hungary), which is a governmental organization, representing the general interest of the public regarding this system. What can the citizen and the authority do to create this ideal situation? An approximately accurate answer to this question, can be obtained by examining the current system and detecting anomalies.

The relationship between the state and the citizen is twofold. The individual expects the state to protect him, so the citizen waives certain of his privilege and thus confers on the state, like enforcing regulations centralized. The purpose of the state is to protect the community; the purpose of the citizen is to protect itself. Therefore, the state must constantly examine whether the services it provides are appropriate for the citizen who confers power on him. If the state discovers problems or anomalies in the investigation of services, it must change them within the specified framework. Traffic rules can be different from country to country in terms of arrangements, over- and under-regulation. However, the main goal of the rules and regulations is not to overburden the citizens with legal knowledge, but to ensure the safety of all participants on the roads [6] [13] [16].

E-Government services are adding more and more service elements worldwide. Citizens have the privilege to conduct their affairs electronically, using the e-government system. The aim of the present study is to examine a part of e-government in Hungary, the online traffic rules education and examination system required to obtain a general driving license. During online traffic rules education, students can decide when and how to learn the curriculum and then take an examination at the end of the process. The online form of education is used in many countries around the world to learn traffic rules. In Hungary, the examination takes place electronically, but the candidate must appear at the examination venue personally [5] [7] [15].

In electronic government systems government operations are supported by web-based services. It involves the use of information technology, specifically the Internet, to facilitate the communication between the government and its citizens.

The citizen's satisfaction depends greatly on the level of the service and the quality of the product and the private companies do everything they can to acquire information about citizens needs in order to convert these expressed needs into new kind of products, shorter lead times, increased service levels [17]. The quality and efficiency of traffic rules education and examination is especially important in the age of developing autonomous vehicles in which case knowing and obeying traffic rules is crucial [18] [19].

This paper examines the traffic rule education and examination system in Hungary by using the Quality Function Deployment method as a new approach towards this complex topic, in order to be able to examine the different goals and objectives of the two separate stakeholders the citizens and the authority. Because of this the Quality Function Deployment method gives as a unique approach to examine these goals and objectives both separately and together to uncover the similarities and differences and their connection to each other [14] [20] [21] [22].

The paper analyses statistical data regarding road safety and accidents, classifies the goals and objectives of the citizens and the authority regarding traffic rules education and examination and provides a mathematical analysis with the help of the Quality Function Deployment approach presenting how the different goals and objectives are connected and what rules should be applied to enhance efficiency and effectiveness.

2 Statistical Analysis of Road Safety in Hungary

In this section the paper will show the statistical analysis of traffic safety. Accidents happen on the roads every day, a small fraction of these accidents are caused by mechanical or technical failures, others caused by drunkenness or other health issues. If we subtract these the main cause of the remaining accidents is mostly the insufficient knowledge of traffic rules or the non-compliance with the traffic rules.

If traffic rules were applied consciously and consistently the number of accidents could be decreased. With increased training and awareness, we assume that the number of accidents can be reduced. For this reason, we believe that great emphasis should be placed on education and application of the traffic rules, as we are of the opinion that in Central European countries only regular training and sanctions can enforce a positive improvement.

The number of road traffic accidents caused by drunk-driving (Figure 1) showed a slight decrease between 2010 and 2019. According to the data the proportion of road traffic accidents caused by drunk-driving between 2010 and 2019 can also be characterized by a slight decrease compared to other types of accidents, and the number of road accidents stagnated from 2016 to 2019. The number of fatal accidents also shows a declining trend (565 cases in 2016 and 530 in 2019).

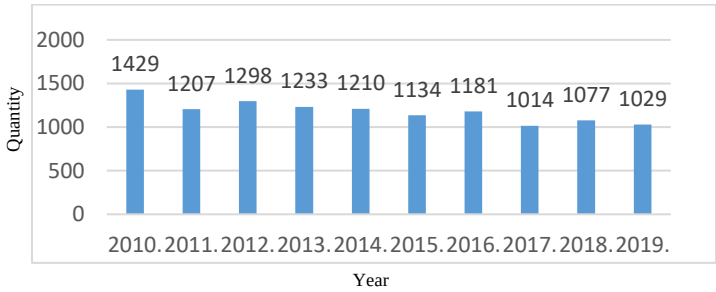


Figure 1

Number of road traffic accidents caused by drunkenness (2010-2019)

Source: Authors' own creation based on Hungarian Central Statistical Office data

Personal injury road accidents show a slight increase in the categories of easily and severely injured between 2016 and 2019, while the number of fatalities decreased slightly (2016: 607 cases, 2019: 602 cases). The number of personal injury road accidents (Figure 2) is mostly caused by passenger cars, their number increased between 2016 (10606 cases) and 2019 (10865 cases), and in 2018 there was a high number of cases (10920). The second most common cause is accidents caused by bicycles and the third most common is caused by accidents involving a freight vehicle. Numbers of 2020 are extrapolated based on the available data.

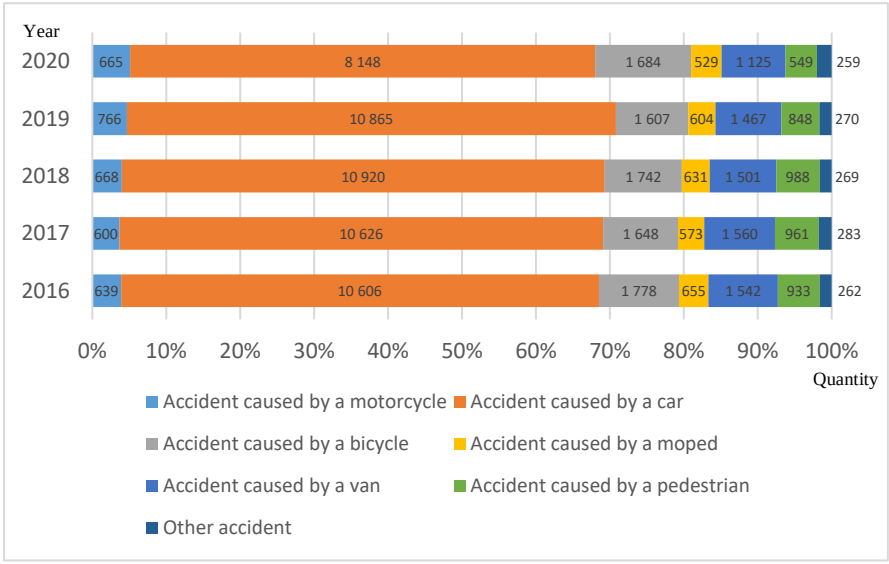


Figure 2

Number of road traffic accidents with personal injuries by causes (case)

Source: Authors' own creation based on Hungarian Central Statistical Office data

Figure 3 shows the causes of the accidents. Numbers of 2020, are extrapolated based on the available data. The most common cause is road track failure and other causes,

the number of cases of which has increased slightly since 2016. The second most common cause is an accident due to pedestrian fault, but their number decreased slightly between 2016 and 2019.

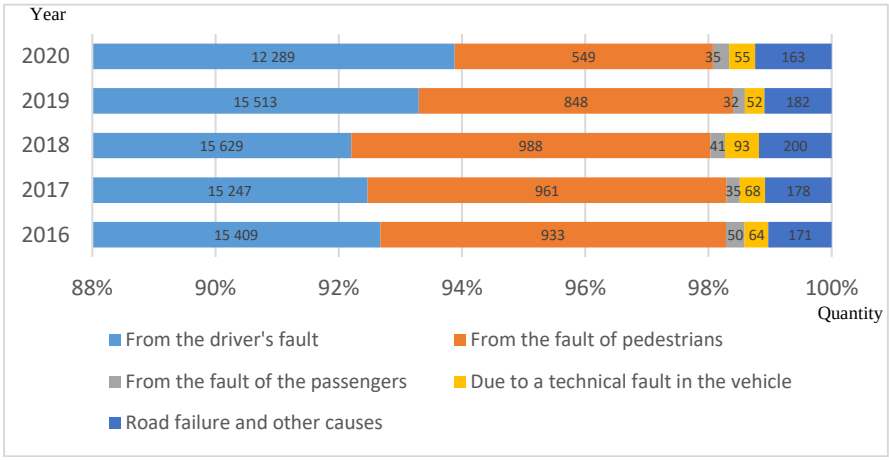


Figure 3
The causes of the accident (cases)
Source: Authors' own creation based on Hungarian Central Statistical Office data

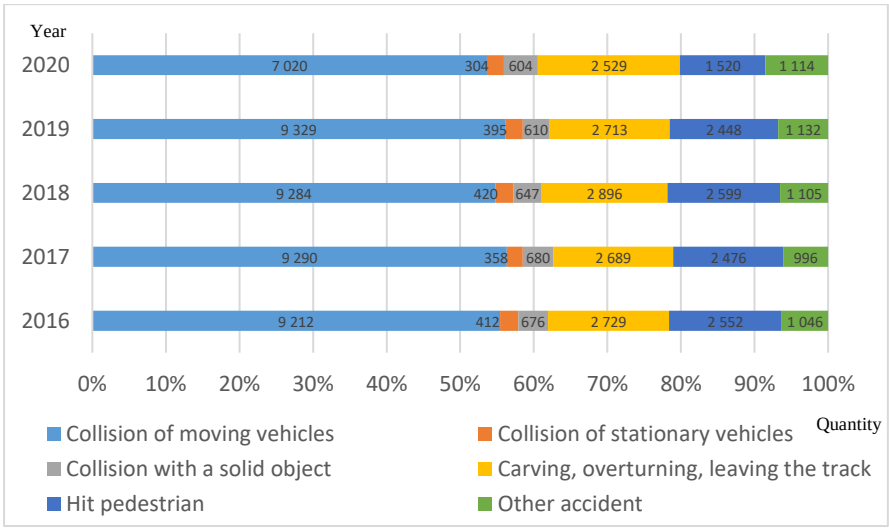


Figure 4
Number of road accidents with personal injuries by nature of the accident (case)
Source: Authors' own creation based on Hungarian Central Statistical Office data

The number of personal injury road accidents is shown by type in Figure 4. The most common are collisions with advanced vehicles, the number of these cases increased between 2016 and 2019 (from 9212 cases to 9329 in the evening).

The second most common accident is carving, overturning, leaving the track and the third is hitting a pedestrian.

Personal injuries are most often caused by drivers' faults. This number of cases did not change significantly between 2001 and 2019, with some decrease. It was exceptionally low in 2012 and exceptionally high in 2006. The number of road accidents caused by pedestrians decreased during the period under review. The results for 2020 are extrapolated, based on the available data.

3 Research Concept

Our research model is described in Figure 5. The areas examined in our study are the e-learning system that can be used to master the traffic rules and the examination system used for the traffic rules examination. As we examine two stakeholders (citizen, authority), we included both stakeholders and both areas in our model. In this study we use the QFD model and we create Quality Function Deployment matrixes [8] [11] [12].

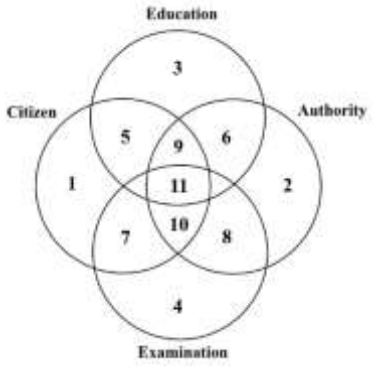


Figure 5
Research model
Source: Authors' own creation

In Figure 1 the numerical labels represent the different sections where the interests of the two stakeholders meet and overlap the education and the examination systems and each other on different levels. Respectively for example the segment labeled by 1 only represent the citizens, the segment labeled by 5 include only citizens and the education system while the segment labeled by 9 include citizens, education system and authority as well.

The research model is based on the contradiction that the citizen's and the authority's goals are not aligned with each other. It is in the citizen's interest to obtain a valid driving license, as that document allows to avoid being penalized

while driving. For the authority, the existence of the license gives the strong assumption that the citizen knows the traffic rules. (In the present study, we deal with the theoretical examination of the traffic rules, we do not cover practical learning and the examination). Thus, while from the point of view of the authority ensuring the necessary knowledge is the final goal, for the citizens the knowledge is just a necessity to be able to drive without penalty.

In this research model, we created two Quality Function Deployment matrixes one for the e-learning system and the other for the examination (in both cases, we examined the perspectives of the citizen and the authority on services separately).

Then, to explore the anomalies and similarities, we use the method - already known and often used in the QFD methodology, - when we identify the opinions and subjective perceptions of the two stakeholders by "stacking" them, meaning that the different preferences of the two stakeholders were combined into one system

In Figure 1, showing the research model, the first number (1) refers to the citizen whose external and internal characteristics influence the learning process and the success of the examination, whose basic purpose is to obtain a license. Number two (2) means the authority whose purpose is to ensure that the driving citizen is licensed, knows the rules of the road and does not cause an accident. Number three (3) is the e-learning system. Number four (4) is the traffic rule examination. The QFD methodology was used in each case to examine further correlations. Number five (5) presents the evaluation of e-learning education from the citizen's perspective. Number six (6) is from the authority's point of view of traffic evaluation education. Number seven (7) points out the anomalies and similarities between the citizen and the authority in the evaluation of road traffic education.

Number eight (8) presents the evaluation of the traffic examination from the citizen's point of view. Number nine (9) shows from the authority's point of view of the traffic test assessment. Number ten (10) points out the anomalies and similarities between the citizen and the authority in the evaluation of the traffic rule examination. The advantage of the model outlined above is that it is able to examine all stakeholders and the activities that arise during the successful acquisition of the theoretical test of the license, to identify areas for the improvement of services.

If we look at the issue of road traffic e-learning education and examinations, the question is: how does the state change the system to make citizens be satisfied? To explain the topic, we take into account accident statistics that accurately show the various causes of accidents, the severity of personal injuries, or accidents by their nature. These statistics are discussed later in this study. The other aspect is the examination of traffic education and examination.

4 Design Procedure for Examining Stakeholder Connections

In our research, we use the Quality Function Deployment approach [1] [2] to structurally compare the goals and objectives of the of the citizens and the authority, both in case of the traffic rules education and the examination process, provided by e-government solutions. According to the literature the QFD methodology is a flexible design tool for products and services. In this context we apply the QFD in order to unravel the nature of connections between the goals and tools of the two stakeholders. However, in contrast to other products, where the interests of the stakeholders are not so different, in case of this e-government service much more complex. The learner-driver (citizen) wants to get the driving license as easy as possible. The traffic authority wants to achieve complete compliance with the traffic rules to minimize accidents. Because of this, we create two different Quality Function Deployment matrixes, combining the goals and objectives of the citizens and the authority.

During the application of the QFD model [3] [10] we formulated the following research questions:

1) What are the expectations of the citizens and the authority in connection with the driving license examinations?
2) What discrepancies can be identified between the two stakeholder groups?

Our research goal is to analyze the expectation of two stakeholders' group, and identify discrepancies, so we have to build one Quality Function Deployment matrix [4] [9] [24] for citizens one for authority.

4.1 Summary of Education and Examination Goals and Objectives of Citizens and the Authority

We present the expectations of the citizens for the two target groups and for the education and examinations separately. Based on our research model, we examine the sections marked with numbers 5-6-7-8 (Figure 1). We apply the QFD method for these sections, by combining the goals and objectives of citizens and the authority regarding the education and examination of traffic rules. The examination of the similarities and differences between the QFDs is examined by the target groups. Thus, we identify based on focus group interviews (two focus groups with 16 participants) the goals and objectives of citizens and the authority for both traffic rule learning and examinations. These goals and objectives serve as tools for the methodological study, to show how the QFD can be used to match the individual and public interest. In the future, it is planned to make a more detailed quantitative research to identify other objectives and goals.

Table 1 summarizes the goals and objectives of the citizens and the authority towards the education of traffic rules while Table 2 summarizes the goals and objectives towards the examination. The goals and objectives were defined based on expert opinions to present the application and main process steps of QFD and to highlight its usefulness.

The initial list of goals and objectives can be expanded and reformed during future researches. According to the principles of E-government in order to achieve a higher level of efficiency the appropriate tools should be applied, thus the authors' goal is to use the current list of goals and objectives to demonstrate the usefulness of the Quality Function Deployment method in this current context.

Table 1
Quality Function Deployment: Education
Source: Authors' own creation

Education			
GOALS	**Citizens**	**G1**	It should be easy to handle
		G2	It should be quick
		G3	Offline usability
		G4	Have smaller modules
		G5	Use simple and clear examples
		G6	Good quality illustrations and animation
		G7	Be up to date
		G8	Be free
	Authority	**G9**	Skill level application of traffic rules
		G10	Continuous knowledge control of traffic rules
		G11	Minimizing education and maintenance costs
OBJECTIVES	**Citizens**	**O1**	It should be easy to use on any device
		O2	Be accessible anywhere
		O3	Whatever time is available for learning
		O4	There should be more market players
		O5	Possibility of pre-trial
		O6	All citizens should receive state support
		O7	All students should be given a digital tool for learning
	Authority	**O8**	Continuous updating and development of system and knowledge material
		O9	Continuous monitoring and feedback function during training
		O10	Education can be solved without the use of human resources

Table 1 contains the goals and objectives of the citizens and the authority based on the research. Goals are general aims of the service design which pave the way of development in order to improve the overall quality. Objectives are more specific issues which have to be addressed in order to improve overall quality. They can be

connected to one or several goals either in a positive or negative way, and there can be also goals to which they are not connected at all.

It is possible to create groups in Table 1 within the goals and objectives of the citizens and the authority, for example in case of education G1, G2 and G3 goals can be all connected to the User-friendly design, G4, G5, G6 goals can be connected to the easy learning. G9 and G10 goals can be connected to road safety. Regarding the objectives of education O1, O2 and O3 objectives can be connected to accessibility, O4 and O5 can be connected to the freedom of choice regarding the learning systems. Regarding the education citizens would prefer a user friendly and flexible environment with easy accessibility to the learning materials, and more opportunity to test their knowledge before the take the examination. Regarding the education, the authority's main goal is to ensure the safety on the roads by demanding high level of knowledge regarding the rules and regulations of traffic participation.

Table 2
Quality Function Deployment: Examination
Source: Authors' own creation

Examination			
GOALS	**Citizens**	**G1**	Pass the examination the first time
		G2	Use simple and clear examples
		G3	Make the examination system easy to use
		G4	Flexible examination times
		G5	The examination location should be easily accessible
	Authority	**G6**	Minimization of accidents due to violation of rules
		G7	100% of all licensed learn the rules of the road.
		G8	Automation of the entire examination system
		G9	Maintain the current course of the examination
OBJECTIVES	**Citizens**	**O1**	Examination dates that are more flexible to the client's needs
		O2	The examination can be taken at any time
		O3	Online examination opportunity
		O4	Multiple examination locations
	Authority	**O5**	Introduction of a system of proficiency tests
		O6	Collect as many fees as possible from participants
		O7	The examination points should remain in their current form
		O8	The need for human resources should remain in the process

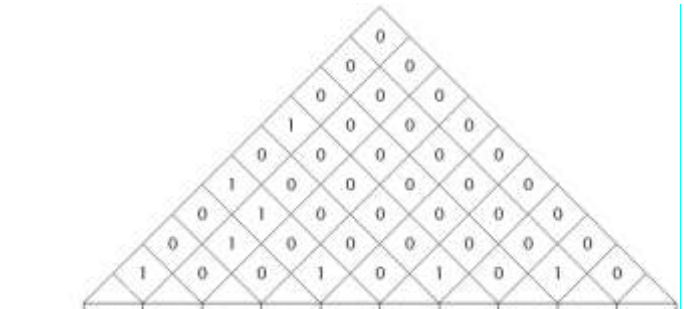
It is possible to create groups in Table 2 within the goals as well. G2, G3 goals can be connected to the content of the examination, G4 and G5 can be connected to the organization of the examination. Regarding the examination citizens' main goal is to pass the examination in order to acquire the driving license, which is necessary to participate legally in the road traffic. In order to do so they would prefer a more

flexible examination environment with an easily usable examination system and well-designed content. Regarding the examination, the main goal of the authority is to minimize the traffic accidents by demanding high level of knowledge regarding the rules and regulations of traffic participation.

4.2 Connections of Goals and Tools and Suggested Future Development Conditions

During the application of the Quality Function Deployment methodology we compared the goals of citizens and the authority regarding the education and the examination against the objectives of the two stakeholders. The results can be seen in Figures 6 and 7, where we used the mathematical formulas represented in Figure 8 to numerically express whether there is a positive, negative or neutral connection between the goals and objectives of the stakeholders and also between the objectives themselves. According to the Quality Function Deployment method objectives can be interpreted as tools serving the goals (desires) of the stakeholders. During a multiple level examination, these tools can be interpreted as goals of a lover level. Because of this high flexibility on some occasions there are no sharp borders between the content of goals and tool on the same level either.

$$r_{ij} = \begin{cases} 1, & positive\ connection \\ 0, & neutral\ connection \\ -1, & negative\ connection \end{cases}$$

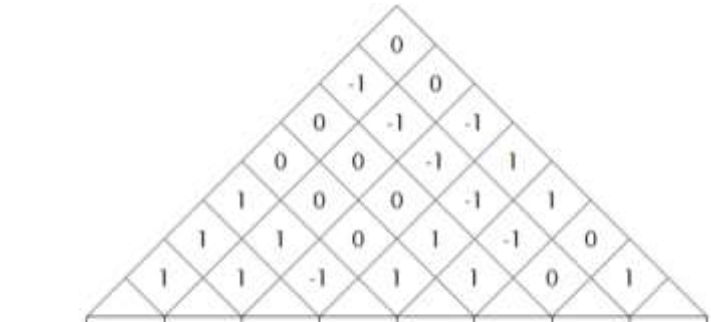


	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10
G1	1	1	1	1	0	0	1	1	1	1
G2	1	1	1	1	1	0	1	1	1	1
G3	1	1	1	1	0	0	1	1	1	1
G4	1	1	1	0	1	0	1	1	1	1
G5	0	0	1	0	0	0	1	1	1	-1
G6	1	1	1	0	0	0	0	1	0	-1
G7	1	0	0	0	0	0	0	1	0	-1
G8	1	1	0	0	-1	-1	1	0	0	-1
G9	1	1	1	1	1	1	1	1	1	0
G10	1	1	1	1	1	1	1	1	1	0
G11	-1	-1	-1	1	-1	1	1	-1	-1	-1

Figure 6
Education QFD of goals and objectives
Source: Authors' own creation

As we can see of Figure 6 regarding education most of the objectives of the citizens and the authorities are neither in a positive nor in a negative connection with each other which indicates that the two stakeholders have a mostly different mindset regarding the subject.

As we can see on Figure 7 regarding the examination there is a more negative connection between the different stakeholders' objectives indicating that the citizens and the authority's expectations are in a stronger contrast with each other regarding this subject.



	O1	O2	O3	O4	O5	O6	O7	O8
G1	1	1	1	0	1	-1	0	0
G2	0	0	0	0	1	-1	0	0
G3	1	1	1	1	1	0	-1	-1
G4	1	1	1	1	-1	0	-1	-1
G5	0	0	1	1	-1	0	-1	-1
G6	0	0	0	0	1	0	0	0
G7	0	0	1	0	1	0	0	0
G8	1	1	1	1	1	-1	-1	-1
G9	-1	-1	-1	-1	-1	1	1	1

Figure 7
Examination QFD of goals and objectives
Source: Authors' own creation

Figure 8 summarizes the matrixes and vectors describing the QFDs regarding the Education and Examination goals and objectives of the citizens and the authority. In this context we are using matrix calculations to describe the connection between the variables. As we can see in Figure 8, we make a difference between the ranking of goals and objectives according to citizens and authority giving us further insights into the details. We also include the costs of the different objectives, as a variable, in our formulas, to help making difference between the resource requirements of the objectives.

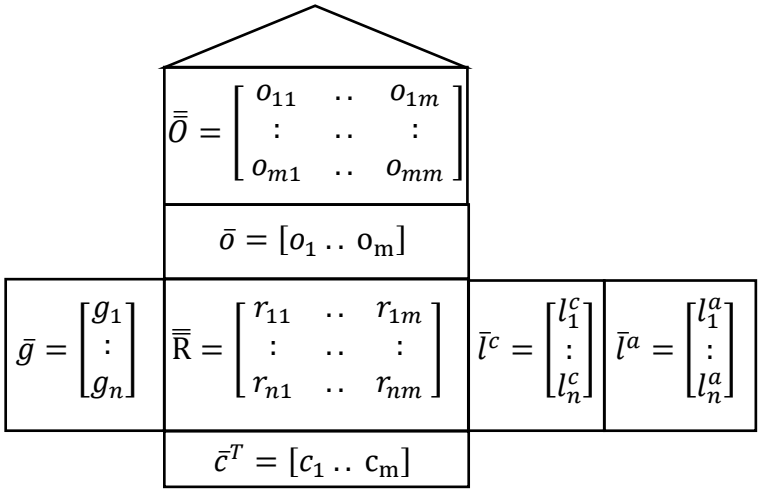


Figure 8
Mathematical formulas for analysis and development
Source: Authors' own creation

$\bar{g} = Goals\ of\ citizens\ and\ authority$

$\bar{o} = Objectives\ of\ citizens\ and\ authority$

$\bar{\bar{O}} = o_{n1} \cdot o_{1n} = \bar{\bar{O}}_{nn}$ *Cross-connection between objectives*

$\bar{\bar{\mathrm{R}}} = Connection\ between\ goals\ and\ objectives$

$r_{ij} = \begin{cases} 1, & positive\ connection \\ 0, & neutral\ connection \\ -1, & negative\ connection \end{cases}$

$\bar{c}^T = Costs\ of\ objectives$

$\bar{l}^c = Ranking\ of\ goals\ according\ to\ citizens$

$\bar{l}^a = Ranking\ of\ goals\ according\ to\ authority$

In the following, we present six conditions (A, B, C, D, E, F) which can be used to evaluate the connections between the goals and objectives of the stakeholders and the cross correlation of objectives, uncovering weaknesses and opportunities of development.

(A) condition

According to the first condition, we state that each objective should have more benefits than harm.

$$r_{ij} \in \{-1; 0; 1\} \tag{1}$$

$$\sum_{i=1}^{n} r_{ij} > 0 \ \ \forall\, j = 1 \ldots m \tag{2}$$

$$r_{ij} = \begin{cases} 1, & positive\ connection \\ 0, & neutral\ connection \\ -1, & negative\ connection \end{cases} \tag{3}$$

(B) condition

According to the second condition, we state that each tool should have more benefits than harm by including into the formula the weights of the different goals as well.

$$\sum_{i=1}^{n} r_{ij} \cdot l_i > 0 \quad \forall j = 1 \dots m \tag{4}$$

Weights represent the order of importance given by the citizens and the authority regarding the goals, but more research is needed to define these weights properly. In this paper we only present an example of usage, presenting that stakeholder priorities are different and depending on the priorities of the legislative act, it will be different if the priorities change.

(C) condition

According to the third condition we state that all targets should be supported to a greater than zero extent, which means that all tools should have a positive role and there should be at least one supporting tool for each purpose, so it must be more than zero when summed line by line.

$$\sum_{j=1}^{m} r_{ij} > 0 \qquad i = 1 \dots n \tag{5}$$

(D) condition

According to the fourth condition we state that all objectives (tools) should have a supporting role in the design, thus after the categorization of their roles we can determine which of them should be changed or excluded from the design.

$$o_{ij} \in \{-1; 0; 1; -\infty\} \tag{6}$$

$$o_{ij} = o_{ji} \tag{7}$$

$$o_{ii} = 0 \tag{8}$$

$$o_{ij} \neq -\infty \tag{9}$$

$$\sum_{i=1}^{n} o_{ij} > 0 \quad \forall j = 1 \dots m \tag{10}$$

$$If\ o_{ij} \begin{cases} > 1, & \text{support} \\ = 0, & \text{neutral} \\ < -1, & \text{weaken} \\ = -\infty, & \text{antagonistic} \end{cases} \tag{11}$$

According to our definition an antagonistic connection can also be presumed, between the objectives, indicated by the (9) formula. In this case, the objectives are incompatible, thus, one of them should be removed or redesigned.

This analysis also requires more data collection and research but this paper provides the initial concept, which can be further tailored by also adding sensibility and coherency tests.

Figures 9 and 10 presents an example regarding the first four conditions in case of education, showing that based on our initial results currently not every goal is supported to a greater than zero extent and there are tools with more negative than positive effects.

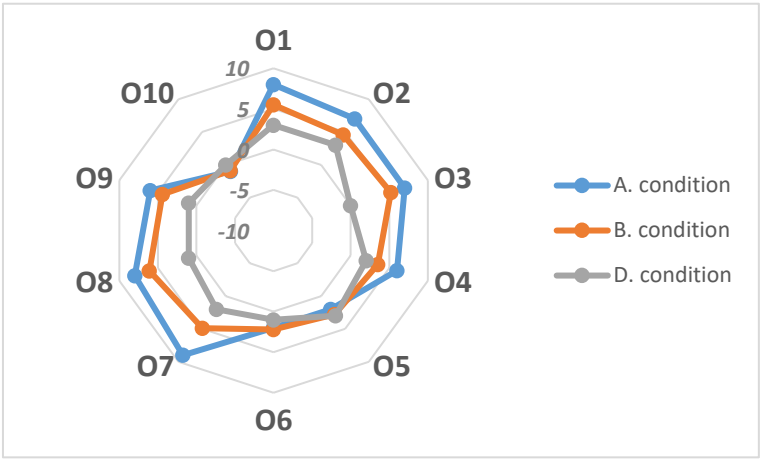


Figure 9
Education objectives according to A., B., and D. conditions
Source: Authors' own creation

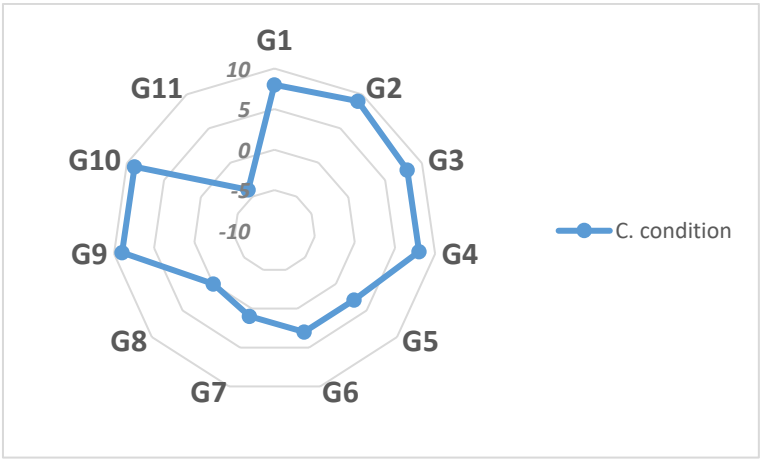


Figure 10
Education goals according to C. condition
Source: Authors' own creation

Figures 11 and 12 presents an example regarding the first four conditions in case of examination, showing that based on our initial results currently not every goal is supported to a greater than zero extent and there are tools with more negative than positive effects as well.

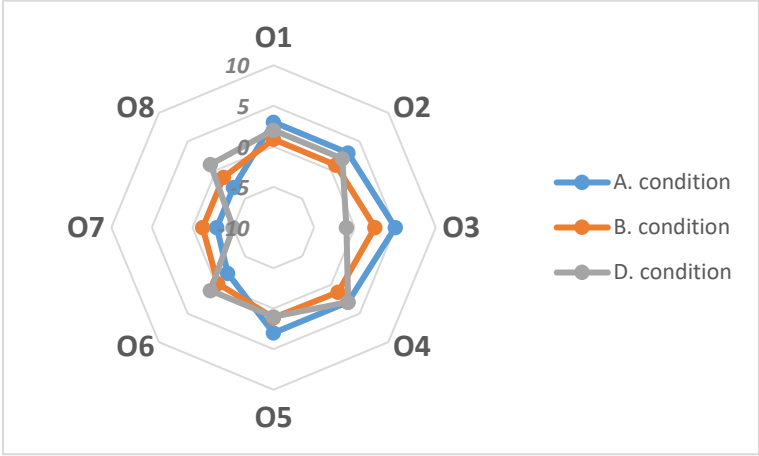


Figure 11
Examination objectives according to A., B., and D. conditions
Source: Authors' own creation

Figure 12
Examination goals according to C. condition
Source: Authors' own creation

The total benefit of each asset can be calculated by using the following formula after determining cost values to each objectives (tools) after a more detailed analysis. This calculation could also help to determine which tools should be

(12)

changed or excluded from the design, after properly defining the individual costs of the objectives.

$$\frac{\sum_{i=1}^{n} r_{ij} \cdot l_{ij}}{C_j} > 0 \;\; \forall j = 1 \dots n$$

(E) condition

For further development we suggest the application of the fifth condition which ensures that all objectives should have a supporting effect in the design and innovation of the education and the examination system, tools having neutral or negative effects should be excluded entirely.

(F) condition

Last but not least by applying the sixth condition we suggest that general coherence and consistency test should be executed during the development to enhance efficiency and regardless of the sum, the number of pieces with negative signs cannot be more than (m-1) / 2

$$Number\ of\ negative\ elements \leq Z\left(\frac{m-e}{2}\right) \tag{13}$$

e: efficiency

Education											
	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	C.
G1	1	1	1	1	0	0	1	1	1	1	8
G2	1	1	1	1	1	0	1	1	1	1	9
G3	1	1	1	1	0	0	1	1	1	1	8
G4	1	1	1	0	1	0	1	1	1	1	8
G5	0	0	1	0	0	0	1	1	1	-1	3
G6	1	1	1	0	0	0	0	1	0	-1	3
G7	1	0	0	0	0	0	0	1	0	-1	1
G8	1	1	0	0	-1	-1	1	0	0	-1	0
G9	1	1	1	1	1	1	1	1	1	0	9
G10	1	1	1	1	1	1	1	1	1	0	9
G11	-1	-1	-1	1	-1	1	1	-1	-1	-1	-4
A.	8	7	7	6	2	2	9	8	6	-1	
B.	6	5	5	4	3	2	5	6	4	-1	
D.	3	3	0	2	3	1	2	1	1	0	

Examination									
	O1	O2	O3	O4	O5	O6	O7	O8	C.
G1	1	1	1	0	1	-1	0	0	3
G2	0	0	0	0	1	-1	0	0	0
G3	1	1	1	1	1	0	-1	-1	3
G4	1	1	1	1	-1	0	-1	-1	1
G5	0	0	1	1	-1	0	-1	-1	-1
G6	0	0	0	0	1	0	0	0	1
G7	0	0	1	0	1	0	0	0	2
G8	1	1	1	1	1	-1	-1	-1	2
G9	-1	-1	-1	-1	-1	1	1	1	-2
A.	3	3	5	3	3	-2	-3	-3	
B.	1	1	3	1	1	0	-1	-1	
D.	2	2	-1	3	1	1	-5	1	

Figure 13

Education and Examination goals and objectives which do not meet a defined condition

Source: Authors' own creation

Figure 13 summarizes which goals and objectives do not meet with one or more defined conditions regarding the presented example. As we can see in case of the education both under supported goals are connected to the cost of education systems and materials, while in case of the objectives the flexibility and the human resource

necessity fail to meet the conditions. Under examination, we can see several goals and objectives require reconsideration. The troublesome goals are in connection with the flexibility of the examination system and examination content, while in the case of the objectives, again the flexibility and the human resource necessity, fail to meet the conditions set.

Conclusions

This paper focused on the goals and objectives of both the citizens and the authority, regarding traffic rules education and examination. The work employed the model of Quality Function Deployment (QFD), to compare these goals and objectives with each other, highlighting both positive and negative connections between them, while also providing a thorough statistical background analysis, regarding the topic of road safety.

Our paper suggests a set of measures, as a design and control technique, for the evaluation of the current connections between the goals and objectives of the stakeholders and also for helping during the design and development of these systems.

The relationship between the authority and the citizen is twofold. The authority wants to ensure that every citizen knows and abides by the traffic rules, in order to minimize the number of accidents on the roads, while the citizens' major goal is to be able to legally use vehicles on the roads and learning the rules is just a means towards that goal.

The suggested conditions can help to parameterize the elements of the design. As we start to tighten the framework, with each condition, it can help to determine which tool should be reconsidered or even excluded from the design, in order to enhance the efficiency of the system, for the sake of both stakeholders.

This paper presents our initial results, with examples of the application of the conditions, which will be further tailored, after a more detailed survey and statistical research is carried out. In our paper, we determined that these methods are useful and can be applied to this complex issue, using the Quality Function Deployment approach, as we are able to identify key points, where improvements can be made. In our future research, we will put a greater focus on the connections and rankings, by collecting more detailed data, using analytical methods, in order to point out inefficiencies, which are worth further research and examination.

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