Taikomoji etika

THE USES OF INTERNET IN THE ETHICAL MULTIPLE CRITERIA DECISION-MAKING

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Recently more and more consumers apply Web-Based decision support systems in practice, because more people have gained the possibility to use the Internet. Also, special requirements for such system's development have been applied. Therefore, traditional models of ethical decision-making cannot always be directly applied in such systems. In this paper the Web-Based Model of Multiple Criteria Ethical Decision-Making is developed by the authors that is based on ethical (autonomy, beneficence, nonmaleficence, justice and fidelity) and decision-making (life-cycle analysis, multi-variant design and multiple criteria analysis, etc.) principles. This Model can help stakeholders to make the best feasible decision in given circumstances. The proposed Model does not make ethical decisions, but explains a process for investigating a situation.

Keywords: ethics, multiple criteria analysis, ethical decision-making models, Web-Based decision support systems.

Introduction

Many ethical qualitative and quantitative decision-making models and methods (Cottone et al., 2000; Robson et al., 2000; Doolittle et al., 1992; Greene et al., 1993, etc.) have been developed in the world. Cottone et al. (2000) present a comprehensive review of the ethical deci-sion-making models' literature from the fall of 1984 through to 1998. Robson et al. (2000) review and consider several models of ethical problem solving. He argues that ethical decisions are reached through intuition, are informed by ethical principles, codes of practice and by making references to the laws of a society. Doolit-

tle et al. (1992) describe six principles that underlie the Herrick-Smith model for ethical decision-making: autonomy and respect, beneficence, nonmaleficence, justice, veracity, and confidentiality. According to Doolittle et al. (1992), their model is comprised of a series of steps: *step one* is the assessment, a process of value clarification, during which objective data is gathered; *step two* is problem definition, in which opposing ethical principles are identified; *step three* is planning, in which alternative responses to the dilemma are placed on a hierarchy according to ethical principles, the values of key people, and projected outcomes, and a choice is made; *step four* is the implementation; *step five* is the evaluation; and *step six* is prizing, which calls for "cherishing the choice." Greene et al. (1993) proposed that their ethical decision-making model have four levels: the societal context, the social policy arena, professional communities, and client-practitioner encounters.

Ethical problems, which arise in different spheres of peoples' activities, may be efficiently solved on the grounds of models of ethical decision-making.

According to Cottone et al. (2000) whether one model is better than another is yet to be determined and in fact, the criteria for what makes a "better" model are not clearly defined in the field, and empirical comparisons are still lacking.

Usually, the interested parties find themselves in complex situations where the right ethical choice is unclear. In such situations, usage of a multiple criteria analysis can help the interested parties identify the course of action that will result in the greatest moral good.

According to the Internet's literature, Web-Based decision support systems have drawn the attention of researchers from a wide spectrum of disciplines. Web-Based Decision Support Systems can play a critical role, in ethical decision-making situations. A variety of questions have been analyzed by the authors in this research to determine which ethical problems can be supported on-line. The results of this study provide a useful insight into creating ones own Web-Based Model of Multiple Criteria Ethical Decision-Making and Ethical Web-Based Decision Support System (EDSS). The proposed Web-Based Model of Multiple Criteria Ethical Decision-Making provides a logical, gradually guide to help in the creation of moral behaviour.

The overall structure of the rest of this paper is as follows: Section 1, discusses the Web-Based Model of Multiple Criteria Ethical Decision-Making as was developed by the authors, Section 2, describes the Ethical Web-Based Decision Support System as was developed by the authors and Section 3, presents an example solution.

1. Web-Based Model of Multiple Criteria Ethical Decision-Making

Corey et al. (1998) noted that because ethical codes cannot be applied in a rote manner and they are incomplete guidelines that reflect the values of the majority, practitioners are more likely to respond to a dilemma based on fundamental principles. The proposed Web-Based Model of Multiple Criteria Ethical Decision-Making is based on ethical principles of autonomy, beneficence, nonmaleficence, justice, and fidelity that are viewed as fundamentals of the stages that make up ethical decision-making. Also, the proposed Model is based on decision-making principles (i. e. principle of a life cycle's analysis, principle of the interrelation of vario-

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us sciences, principle of multi-variant design and multiple criteria analysis of alternatives and principle of close interrelation between the alternative's priority and the interested parties and their aims). The decision-maker' freedom of choice is stressed in the principle of autonomy. The stakeholder is encouraged to take responsibility for his/her actions and assess the effects of these actions on others. According to the principle of beneficence it is important to meet the integrated stakeholders needs, e.g. physical, economical, social, political, emotional, spiritual, etc. The principle of nonmaleficence is strongly linked to the principle of beneficence and means doing no harm to others. The principle of justice means the support of equal allocation of burdens and benefits (ethical, legal and other issues) among all stakeholders. Efforts are made to achieve a truthful, ethical and efficient solution, i. e. to optimize the life cycle of the alternative (principle of life cycle's analysis). The problems of truthfulness, ethics and efficiency of the solution may be successfully solved only when the achievements of various sciences, such as philosophy, ethics, Law, psychology, management, economics and aesthetics, etc. are used. The use of a principle of multi-variant design and multiple criteria analysis makes it possible to develop many alternative versions and carry out their ethical and other kinds of optimizations throughout life cycle of the alternative.

The above principles are landmarks of the proposed model and as support to solving the ethical dilemma. In different situations a few ethical principles sometimes oppose each other, and grading them are difficult.

According to Garfat and Ricks (1995), ethics is no longer about determining "right answers", but whether and how the decision maker decides what action to take. Ethical decision-making is a process governed by ethical principles. Also, when confronted with a complicated ethical dilemma that is not evidently analyzed in codes of ethics, the decision-maker should check with an ethical decision-making model.

Principle of justice	Principles of beneficence	Principle of nonmaleficence
Principle of autonomy	**Ethical principles**	Principle of fidelity

Ethical and decision-making principles used in the Model of Multiple Criteria Ethical Decision Making

Decision-Making principles	
Principle of life cycle's analysis	Principle of interrelation of various sciences
Principle of multi-variant design and multiple criteria analysis of alternatives	Principle of close interrelation between alternative's priority and interested parties and their aims

Fig. 1. *Ethical and decision-making principles used in the Web-Based Model of Multiple Criteria Ethical Decision-Making*

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Based on the analysis of the above ethical decision making models (Cottone et al., 2000; Robson et al., 2000; Doolittle et al., 1992; Greene et al., 1993; Tymchuk, 1986; Walden, 1990; Bombara, 2002, etc.) a Web-Based Model of Multiple Criteria Ethical Decision-Making was developed by the authors of this paper. Some stages of the Model described in the paper (see Stages 1–3, 8, 9) are partly similar to the stages of the models proposed by some other authors. All other stages differ in principle, since the methods of multiple criteria analysis created by authors are applied and also, this Model is meant for the buildup of the Web-Based decision support system.

The proposed Web-Based Model of Multiple Criteria Ethical Decision-Making provides a logical system and gradually guides and helps the user in the creation of acting in a way that includes moral behavior. These stages are the main steps of action and can be shaped into the framework of particular circumstances.

The ten stages of Web-Based Model of Multiple Criteria Ethical Decision-Making are as follows:

Stage 1. Obtaining as much objective and subjective information (historical information, institutional, legal, societal expectations and limitations, ethical principles involved, identified conflicts, etc.) as possible. Further, if possible, the decision-makers have to develop suitable arguments on diverse aspects of the dilemma so as to have a high-quality perception of the range of concerns and advantages for each position.

Stage 2. Analysis of stakeholders. The stakeholders are identified as the interested parties who are directly or indirectly influenced by the decision that is to be made. For a better understanding of the current situation, discussions among the various interested parties are often

necessary. Also, some ethical dilemmas can be prevented through dialogue between stakeholders. The discussion should engage all those who are the key stakeholders, some of who may be the decision-maker and some of whom may be influenced by the decision. The reaction that results from such discussions clears personal values while determining value conflicts. Stakeholders have to act as a team in an effort to come to some commonly suitable decisions. All stakeholders should accept some responsibility for the existing situation and have to be a part of any proposed decision. The personal values, theoretical orientation, experience and other stakeholder features play a part in achieving ethical decisions. Stakeholders have to analyze their own value judgments, religious beliefs, moral codes, experience with similar situations, and decide how to avoid injecting personal biases into decisions. Also, the decision maker must examine the values of others stakeholders. Compromises that may diminish harmful consequences should be analyzed. On the ground of the Model offered, decisions may be made from the viewpoint of one, several or all the interested groups.

Stage 3. Definition of the problem (conflicting ethical principles, value conflicts) and determination of the nature of the dilemma. According to Joseph (1982), an ethical dilemma is a conflict in which a person must make a choice between several correct and conflicting decisions, generally with some negative consequences. Traditionally, dilemma (ethical, legal/moral, etc.) involves a choice between competing goods with possible harmful consequences. Assessment of a dilemma involves the detection of different conflicting ethical principles. Typically, the ethical dilemmas are inherently problem situations that do not lead to easy decisions and

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there is no right or wrong one that can be easily recognized. Therefore, conflict between values of the different stakeholders leads to an ethical dilemma where there is no easy solution and no right or wrong answer.

Stage 4. Determination of the philosophy theories (e.g., utilitarianism, deontology, justice, etc.) according to which the alternatives will be evaluated and the decision made. Determination of the ethical ideal is made in concrete circumstances.

Stage 5. Search for the description of analogous typical situations in the available literature and a development of the best practice database.

Stage 6. Development of comparative tables (see Chapter 2). The aim at this stage is to build options for the decision, in preparation for making the ethical decision and arguing for the choice. Results of the generation of all possible courses of action have been submitted in the table. By submission, such a display, of the multiple criteria comparisons can become more effectively supported. As in any problematic circumstances, the stakeholders search for potential compromises by trying to find one that is most ethical and with the least negative consequences.

Stage 7. Evaluation of ethical alternatives. A decision maker must examine a large number of alternatives, each of which is surrounded by a considerable amount of information. Alternatives are analyzed along with the involved ethical principles and philosophical theories. The expectations and obligations of different stakeholders are then considered. Alternatives not satisfying some restrictions (i. e., the moral, legal, institutional, and societal expectations and constraints) are not further analyzed. Alternative solutions are compared in terms of the possible outcomes and according to the selected philosophical theories. Following on from gathering this information, the priority and utility degree of the alternatives is then calculated. The utility degree is directly proportional to the relative effect of the values and weights of the criteria and is considered on the efficiency of the alternative. This helps a decision-maker to decide what alternative best fit the situation that is under evaluation (i. e. the best solution achievable given the available resources and the circumstances of the dilemma). Several decisions will have priority and the choice is according to the preferences of different stakeholders and philosophy theories (e.g., utilitarianism, deontology, justice, etc.).

Priority of decisions depends a lot on whether one group or several interested groups make the decision, because different stakeholders bring diverse experiences, beliefs, and moral codes into the decision-making process. The Ethical Web-Based Decision Support System (EDSS) developed on the basis of this model enables the analysis of alternatives from the viewpoint of different interested groups. Also, frequently time and financial and other resources are perceived to be more significant than ethical principles. However, there is seldom an ideal decision to an ethical dilemma.

Stage 8. Implementation of a course of action. Implementing the decision may be the most difficult stage of the decision-making process. Ethical decisions are individual choices that may not be shared with other stakeholders. The decision-maker may be in a solitary situation in implementing some decisions and willing to admit the consequences of a decision that is not supported by others.

Stage 9. Monitoring of the action and its outcome.

Stage 10. Rehabilitation of the external and ethically advantageous environment in order to avoid potentially conflicting situations or to diminish their negative impact. Truthfulness, ethics and efficiency of the solution depend on the micro- and macro-levels of the external environment. Macro-level factors of the external environment such as religion, the existing cultural, social, ethical dimensions of the country, the executed governmental policy, the society, economics and the Law (the labor law, etc.) influence the arising ethical problems and the ethical solution making. The micro-level factors (the stakeholders, the applied formal code of ethics, rules, criteria of ethical behavior, ethical standards, codes of conduct) stipulate the ethical solution making to a significant degree as well. Therefore, on the grounds of cumulative experiences it is suggested that there be changes under these possibilities of the surrounding environment in order to decrease the possibility of a conflict situation arising or to diminish their negative impact. Developing an ethical environment also provides a background for ethical questioning, significant exchange, informed decision-making, and human consensus, in which all stakeholders are satisfied.

The above-described Web-Based Model of Multiple Criteria Ethical Decision-Making can provide decision-makers with quite a secure means of making difficult ethical decisions. This model can also help stakeholders to make the best feasible decision in certain given circumstances. The proposed Model does not make ethical decisions, but explains the process for investigating a situation.

Based on the proposed Model of Multiple Criteria Ethical Decision-Making an Ethical Multiple Criteria Decision Support Web-Based System (http://dss.vtu.lt/ethic/index_eng.htm) was developed by the authors.

In order to throw more light on the subject, a more detailed description of one of the above mentioned stages (collection of initial data for a multiple criteria analysis) of the analysis are as follow.

The determination of the ethical alternative's utility degree and the establishment of the order of priority for its implementation has fewer difficulties if the criteria values and weights are obtained and when multiple criteria analysis methods are used.

The results of the comparative analysis of ethical alternatives are presented as a grouped decision-making matrix where columns contain n alternatives, while all the quantitative and conceptual information pertaining to them is found in Table 1.

Quantitative objective (different cost factors, facts, expectations, legal constraints, ethical principles) and subjective (values, feelings, beliefs) information is based on criteria systems and subsystems, units of measure, values and initial weights of the ethical alternatives.

The presentation of information needed for decision-making may be in conceptual and quantitative forms.

Conceptual information is a more flexible but less accurate means of expressing estimates than when using numbers. Quantitative information is more accurate and reliable and allows one to use multiple criteria decision-making methods.

The information's grouping in the matrix should be performed so as to facilitate the calculation process and to express their meaning.

When developing a decision-making matrix it is efficient to make complex use of several ethical theories that best correspond to the is-

Table 1. **Grouped decision-making matrix of ethical alternatives in a multiple criteria analysis**

Quantitative information relevant to ethical alternatives									
Criteria describing ethical alternatives	$*$	Weights	Measuring units	Comparable ethical alternatives					
				1	2	...	j	...	n
X_1	Z_1	q_1	m_1	x_{11}	x_{12}	...	x_{1j}	...	x_{1n}
X_2	z_2	q_2	m_2	x_{21}	x_{22}	...	x_{2j}	...	x_{2n}
Quantitative criteria ...	...	...	...	...	...	...	...	...	...
X_i	z_i	q_i	m_i	x_{i1}	x_{i2}	...	x_{ij}	...	x_{in}
...	...	...	...	...	...	...	...	...	...
X_t	z_t	q_t	m_t	x_{t1}	x_{t2}	...	x_{tj}	...	x_{tn}
X_{t+1}	z_{t+1}	q_{t+1}	m_{t+1}	$x_{t+1\,1}$	$x_{t+1\,2}$	...	$x_{t+1\,j}$	...	$x_{t+1\,n}$
X_{t+2}	z_{t+2}	q_{t+2}	m_{t+2}	$x_{t+2\,1}$	$x_{t+2\,2}$	...	$x_{t+2\,j}$	...	$x_{t+2\,n}$
Qualitative criteria ...	...	...	...	...	...	...	...	...	...
X_i	z_i	q_i	m_i	x_{i1}	x_{i2}	...	x_{ij}	...	x_{in}
...	...	...	...	...	...	...	...	...	...
X_m	z_m	q_m	m_m	x_{m1}	x_{m2}	...	x_{mj}	...	x_{mn}
Conceptual information relevant to ethical alternatives (i. e. text, graphics, video tapes)									
C_f	C_z	C_q	C_m	C_1	C_2	...	C_j	...	C_n

* The sign z_i (+/-) indicates that a greater/lesser criterion value corresponds to a greater significance for a stakeholder

sue that is under consideration. For example, deontological ethics is strongest in many areas where utilitarianism is the weakest area. Each of these theories emphasizes certain moral worth that sometimes contradict other theories.

According to utilitarianism, all consequences must be measured and weighed. Positive and negative consequences may be defined in terms of pleasure, happiness, ideals and preferences. For any given action, utilitarianism is calculated for all the available alternatives, e.g. how many people will be affected, negatively and positively and how intensely they will be affected? Pleasure and preference satisfaction are easier to quantify than happiness or ideals. Some consequences (love, family, etc.) cannot easily be quantified, while other aspects (productivity, material goods) may be emphasized precisely because they are quantifiable.

When utilitarianism considers the issue of consequences, it analyzes who is to be included within that circle. Who will decide what is good or evil, right or wrong for each particular group? Who does the calculating? Typically, the calculating differs depending on who does the counting.

Many people think that people, who keep to ethical principles and rules, make ethical decisions, whereas the decisions made by persons who pay less attention to these principles and rules, are less ethical. However, the ethics of these solutions is greatly influenced by the number of analyzed alternatives, the exhaustiveness of the criteria, which define the alternatives, and other factors used for ethical solution making. For example when a moral, less educated person has evaluated only several influencing factors, after having analyzed 5% of alternatives. A less moral, but well-educated person will have specified all the influencing factors, after having analyzed 95% of alternatives. Which one of them will make a rational truthful, ethical and efficient solution? Thus, so as to increase the

truthfulness, ethics and efficiency of the adopted solution, education in the field of ethics should be expanded and then the latter would serve as grounds for the stimulation of moral perfection.

The creation of alternatives and the evaluation of values and weights of descriptive criteria serve as one of the most important stages in the determination of rational alternatives. There are always many alternatives in the course of making an ethical decision. For example when aiming at helping children who have been adopted by a children's home and for whom we can gather donations, invite to our homes for a celebration of different festive occasions, spend summer holidays together and/or create an external micro- and macro-level environment, which actually creates better living conditions for the children.

The developed alternatives should also meet certain restrictions, e.g. are the rights respected? Are the duties performed? Is justice observed? The alternatives, which do not meet these restrictions, are here not analyzed any further.

The systems of criteria are developed so that the values and weights of these criteria are evaluated on the grounds of ethical theories, the legal system, formal codes of ethics, rules, criteria of ethical behavior, ethical standards, codes of conduct, use of experts and other methods.

Different criteria may be analyzed, depending on the goals of the stakeholders, i. e. efficiency, non-violation of rights, execution of duties, upholding the given promise, honesty, upholding professional values, loyalty towards the place of employment and friends, conformity of behavior with social demands, the current and future number of the active stakeholders, the level of resistance towards the implementation of the adopted decision, seeking for a more interesting and/or better paid and a virtual job or for a higher position and social acknowledgement, etc. As one may see, the possibility of a smaller or a larger conflict-of-interest between the stakeholders always exists due to the availability of such a large variety of criteria of ethical behavior and demands from the stakeholders. The more active these stakeholders are, the greater the possibility for the appearance of new ethical problems. On the other hand, if large ethical problems exist, principal upholding of all ethical principles and rules causes a certain risk. Such a situation may lead to an increase of internal moral tension with all the consequences ensuing from there (e.g. a bad mood, sleepless nights), to the breaking off of a friendship and cooperation with other stakeholders or to the aggravation of career perspectives.

According to Brans (2002), it is crucial to have the Ethical weights well defined. Who is going to fix them and what are the responsibilities? A group of Independent Experts can possibly advice the Decision-makers (Brans, 2002) in these and similar situations. Hundert (1987) pointed out the difficulty of articulating the process by which the worth of one value is balanced against another.

In the course of decision-making, a higher priority is given to certain moral values, whereas less attention is drawn to other ones. While estimating the weight of the criteria, one should determine which demands of the stakeholders are more significant and to which extent and which criteria of ethical behavior, etc. is more significant.

The positive and negative qualities of alternatives are vividly reflected in the developed decision-making matrix. After having performed a multiple criteria analysis of the possible alternatives then the rational variants, which can be practically implemented, are determined.

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The priority and utility degree of the comparative versions can be determined, after one has created alternatives and calculated the values and weights of the descriptive criteria in the course of the application of the methods of multiple criteria analysis.

2. The Ethical Web-Based Decision Support System

In consideration of the popularity and spread of the Internet, Web-Based decision support systems may be used practically all over the world. With reference to ethical decision-making models it is possible to solve ethical problems, resulting in various fields of human activities, in a more effective way. Some people study and apply different ethical theories in practice. It goes without saying that a person doing that feels much stronger as if he/she is sharing in the moral responsibility with these theories.

The majority of moral problems are repeated a thousand times. When a child watches television all day long or plays computer games, he/she may harm his/her health. An employer treats his/her employees incorrectly. A husband and a wife argue over various issues. Such or very similar situations occur in life very frequently. There are many possible miscellaneous variations on how to act in these situations. How should one act in any situations similar to these and what kind of decision is more truthful, ethical and efficient? There is the Web-Based Model of Multiple Criteria Ethical Decision-Making that can be used to solve such problems or other practical ethical problems.

Barthélemy et al. (2002) emphasize the role of human factors in Decision Support Systems and the related assisting tools that can be used in the Operational Research field, which links both historical information and real life realizations concerning the human centered processes.

Based on the proposed Web-Based Model of Multiple Criteria Ethical Decision-Making an Ethical Multiple Criteria Decision Support Web-Based System (http://dss.vtu.lt/ethic/index_eng.htm) was developed by the authors. The Ethical Multiple Criteria Decision Support Web-Based System (EDSS) consists of a database, a database of best practice, a database management system, a model-base, a model-base management system and user interface.
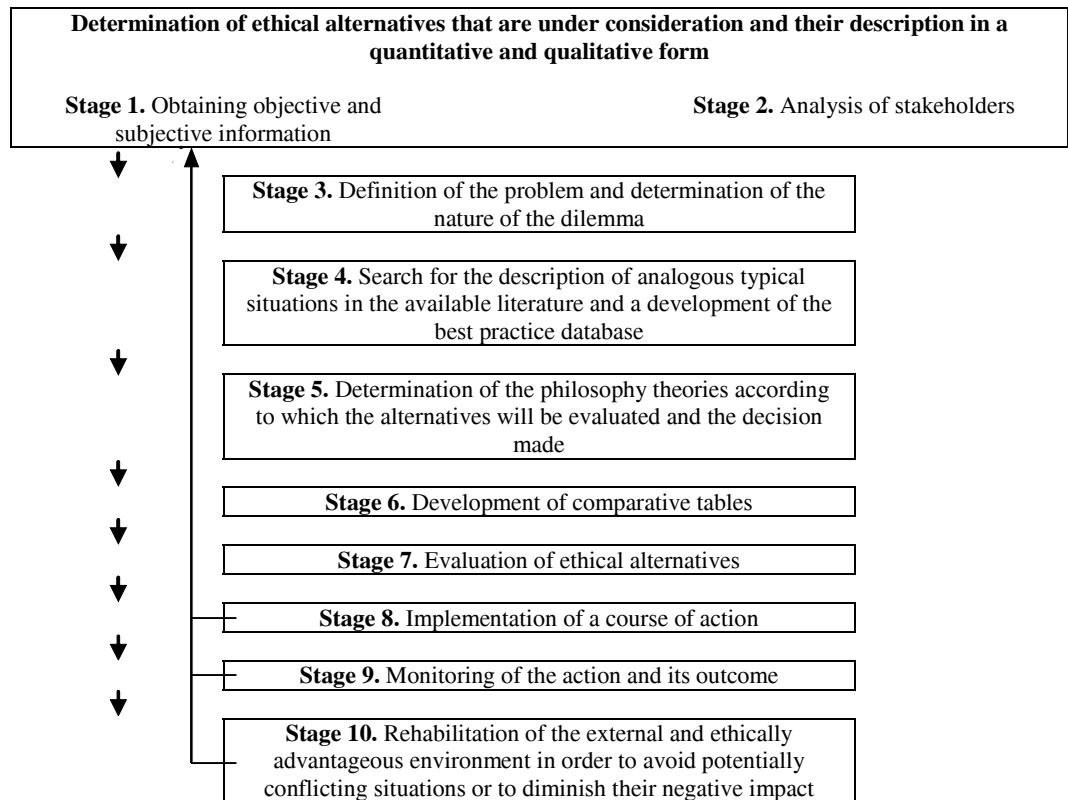
Main stages of the developed Model of Multiple Criteria Ethical Decision-Making and their relation with EDSS are presented in Figure 2. According to the Web-Based Model of Multiple Criteria Ethical Decision-Making developed be the paper's authors, possible alternatives are firstly determined and described in a quantitative and qualitative form (1–3 stages). In this way, the initial database for problem analysis was designed. In order to evaluate the worldwide practice of this problem's solution, the best practice database was developed (4th stage). According to the 5th stage of the Model, it is possible to choose the philosophical theories as a base for the analysis of developed alternatives in the form of a decision-making matrix. The alternatives may be analyzed according to one theory of philosophy (deontology, utilitarianism, justice) or their combinations (see Figure 3). By performing an analysis of the alternatives, the necessary information is obtained from the initial database and the database of best practice and is inserted into the decision-making matrix (6th stage). At the 7th stage the analysis of alternatives is performed with the help of EDSS.

In order to select the most truthful, ethical and efficient decision the 8–10 stages of the de-

veloped model and the EDSS may be used as well. For instance, when implementing the stages 8–10 of the Model various difficulties and unforeseen circumstances may occur, the situation may change in due course of time. Aiming at reacting to a new situation more effectively or at solving problems ratable alternatives are to be made anew turning back to the first stage of the model. The alternatives are described quantitatively and qualitatively referring to the current situation and the available best world wide experience (see stages 1–4). On developing the matrix of decision-making the alternatives are estimated according to the selected theories of philosophy (see stages 5–7). In that case, as the situation has changed, the procedure chosen in the stages 8–10 of the model is possible to be analyzed and a truthful, ethical and efficient decision is to be made applying EDSS.

A short description of the EDSS follows.

Figure 2. Main stages of the developed Web-Based Model of Multiple Criteria Ethical Decision-Making and their relation with EDSS

The developed EDSS is bilingual. The Lithuanian and English languages can be used. Presently, the system contains three functioning samples (http://dss.vtu.lt/ethic/index_eng.htm) with databases made specially for them. There is also a possibility to introduce additional sam-
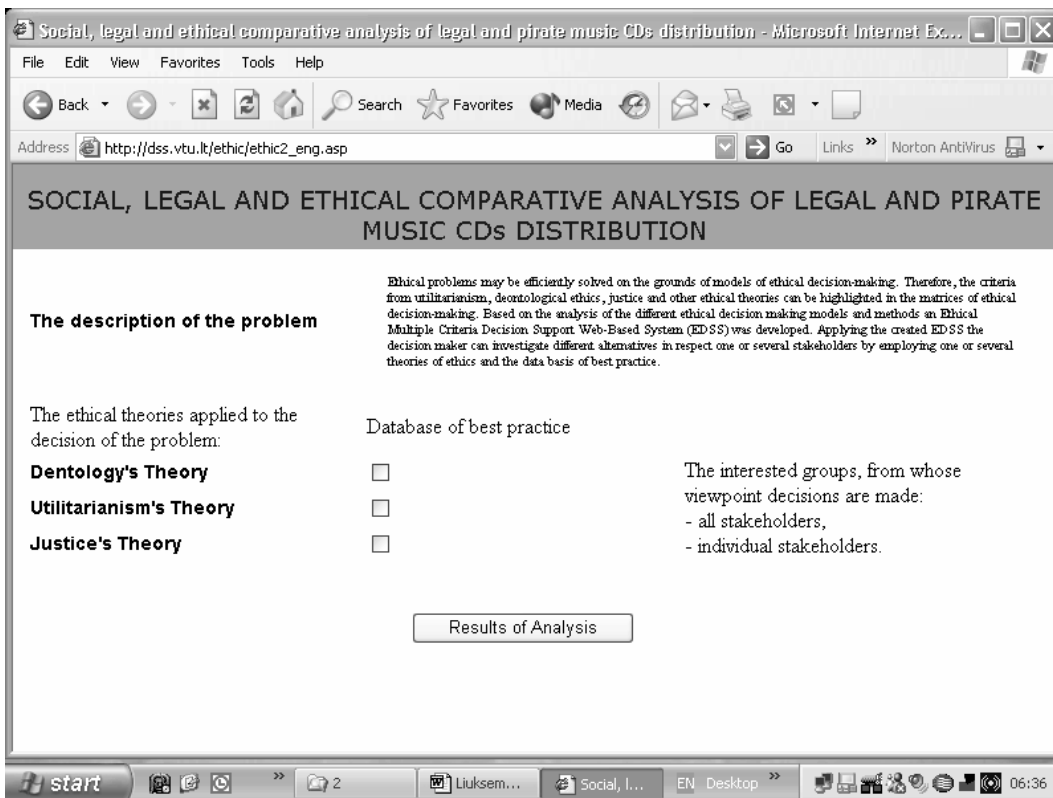
Figure 3. *Analysis of ethical alternatives according to one philosophical theory or a combination of theories*

ples and a database of the best practice on the main website of the system. This extra information is possible to be introduced in any part of the world with a system administrator's consent. As Figure 3 indicates, these samples are possible to be analyzed referring to three theories of philosophy (deontology, utilitarianism, justice).

The presentation of information needed for decision-making in the EDSS may be in conceptual forms (i. e. digital/numerical, textual, graphical, diagrams, graphs and drawing, photographic, sound, video) and quantitative forms.

The presentation of quantitative information involves criteria (quantitative and qualitative)

systems and subsystems, units of measurement, values and initial weights that fully define the provided alternatives. Conceptual information means a conceptual description of the alternative solutions, the criteria and ways of determining their values and the weights, etc.

The character of the objective's choice for the most efficient alternative is largely dependent on all available information. It should also be noted that the quantitative criteria are objective. The actual ethical decisions have real costs. The values of the qualitative criteria are usually rather subjective though the intervention of experts with various methods may enhance the objectivity in judgment.

In this way, the EDSS enables the decision-maker to receive various conceptual and quantitative information on ethical decision making from a database and a model-base allowing him/her to analyze the above factors and to form an efficient solution.

The user seeking for an efficient ethical decision solution should provide, in the database that is assessing the ethical decision solutions, the exact information about alternatives that are under consideration. It should be noted that various users making a multiple criteria analysis of the same alternatives, often get diverse results. This may be due to the diversity of the overall aims of the users. For example, Kilner (1990) examines the ethical basis for selecting which patients will receive medical treatment if there are not sufficient resources to treat all in need. Sixteen patient-selection criteria were identified by Kilner (1990) on the completion of a large survey of American medical directors: the social value of the patient; favored group status (children, or veterans, for example); resources required for treatment; special responsibilities of the patient (heads of household, for example); age; psychological ability; supportive environment; medical benefit; likelihood of imminent death; likelihood of benefit; length of benefit; quality of benefit; willingness to cooperate in treatment; ability to pay; random selection; and experimental nature of the treatment.

Therefore, the initial data provided by various users for calculating the ethical decision differs and consequently leads to various final results. However, if all stakeholders prepare the initial data for an analysis jointly, it increases the effectiveness of the decision-making.

Thus, the creation of a data base of typical ethical problems, their solutions (possible al-ternatives; the system of criteria, which describe the alternatives, their values and weights) and the typical rules of decision-making, for example, "'Treat others in the same way as you would like to be treated by them", "Justice is a subjective matter", "Do not cause harm" is rational. Based on the necessity to include theses aspects, this database can be used in the process of practical decision-making. For example, by taking into consideration the understanding that "Justice is a subjective matter", one may draw the conclusion as follows: it is advisable to deal with those people, who have the same outlook, who refer to the similar values, who strive for the similar goals and whose characters and temperaments are in line. In this case, objective conditions will be created for decreasing different ethical problems that could arise.

The interested parties have their specific needs. Therefore, every time the party uses the EDSS they may make corrections to the database according to their aims.

The model-base of the EDSS should include models that enable a decision-maker to do a comprehensive analysis of the available alternatives and to make a proper choice.

The following multiple criteria analysis methods and models as developed by the authors (Zavadskas and Kaklauskas, 1999) are used by the EDSS in an analysis of ethical alternatives (see: http://dss.vtu.lt/ethic/index_eng.htm):

1. A new method and model for a complex determination of the weight of the criteria taking into account their quantitative and qualitative characteristics was developed. This method allows one to calculate and co-ordinate the weights of the quantitative and qualitative criteria according to the above characteristics.

2. A new method and model of multiple criteria complex proportional evaluation of alter-

natives enabling the user to obtain a reduced criterion determining the complex (overall) efficiency and the utility degree of the alternative was suggested. The method of complex proportional evaluation assumes direct and proportional dependence of significance and the utility degree of investigated versions on a system of criteria that adequately describes the alternatives and on values and weights of the criteria. The decision maker by using the experts' methods determines the system of criteria and calculates the values and initial weights of the qualitative criteria.

The management system of the model base allows a person to modify the available models, eliminate those that are no longer needed and add some new models that are linked to the existing ones.

Application of EDSS allows one to determine the strengths and weaknesses of the ethical alternatives. Calculations were made to allow one to find by what degree one alternative is better than another and the reasons are disclosed as to why this is namely so. Landmarks can be set for an increase in truthfulness, ethics and the efficiency of alternatives. All this can be done argumentatively and based on criteria that were under investigation as well as on their values and weights. This saved users' time considerably by allowing them to increase both the efficiency and the quality of the ethical decision analysis.

The created Ethical Web-Based Decision-Support System may also help stakeholders to manage their mutual relationship efficiently, to minimize the conflict-of-interest situations and to solve them.

In order to demonstrate the application of the EDSS a practical example of a multiple criteria analysis of marketing interviews alternatives is considered below.

3. Social, legal and ethical comparative analysis of legal and pirate music CD distribution

In order to demonstrate the application of the EDSS a practical example of a multiple criteria analysis of ethics' alternatives (purchase of legal compact and pirated compact discs) is considered below.

In September of 2001, after conducting a poll covering 1,000 respondents, it was established that during three summer months 15.9% of those interviewed bought compact discs and 19.6% of those interviewed bought music tapes. The results of the survey showed that 42.5% of those interviewed (buyers) bought illegally sold compacts discs. About the same percentage of respondents (buyer) bought pirated tapes. Thus, from 1,000 respondents 6,76% (15.9%*0,425 = 6,76%) bought illegally sold compacts discs and 8,33% (19.6%*0,425% = 8,33%) bought pirated tapes. Therefore, the situation is not good for the music people. What reasons lie beneath all such activities? Some of them are outlined briefly in the following paragraphs.

After legal music records in Lithuania pass through all tax payments, customs, profit tax, etc. and barriers that have been established by the state (some of which are justifiable while others are not) the price of music increases by 45%. In Lithuanian music stores, a foreign compact disc costs about LTL 48–70 (1 Euro = 3.45 LTL) while illegal dealers sell a disc for LTL 8–18. A compact disc in the USA several weeks after leaving the charts of the most popular and trendy records costs $5, which is about the price of one hamburger. In Germany, Italy, or France a CD costs about 5-11 Euro. Therefore, an ordinary buyer of recorded music understands that it is wrong to help pirated product distributors earn high profits but nevertheless buys the ille-

gal products. He/she has one well-founded argument: his/her (i. e. music lover's) buying power is so low and the price for foreign CD's and local CD's, which until recently local have also been very expensive, and because both are so high in price, he/she simply has no other choice.

Under Lithuanian law, when the legal value of illegally produced or sold storage media is higher than 43,000 LTL, the person can be sentenced to up to two years imprisonment for breaking this law.

Also, it should be taken into account that Lithuanian residents' salaries are not very high. The average salary of a Lithuanian employee makes up to only 370 Euros. Further, salaries in cities are higher, but in villages are less.

By taking into consideration the above-mentioned factors we can see that an evaluation of the purchase of legal compact and pirated compact discs from the ethical point of view is not so unambiguous. From one side, all purchasers would like to behave ethically, however, a comparison of the high prices of compact discs and the not so high salaries shows a reduction of this wish. The final choice is predetermined by other factors as well, such as living experiences, educational background and distance to the nearest compact disc shop, etc. This ethical problem is not typical of the well off, as they mostly acquire legal compact discs. It is necessary to underline that the example being examined in this chapter is a broad-brush view of Vilnius. Results of an analysis of every individual's case may be different depending on the specific situation.

The multiple criteria analysis of the buying of legal compact and pirated compact discs ethical alternatives is described below.

The following criteria for determining the *greatest moral good* alternative is based on ex-

tensive literature study (B. Tan, 2002, etc.), interviews and experts' opinions (see Table 2). They are as follows: accessibility of compact disk to the consumer (price of compact music disk, presence of compact music disk in the market, accessibility of compact music disks to consumers (place), accessibility of compact music disk to consumers (time); legality of compact disk distribution (legality of distribution, presence of legal responsibility for illegal distribution of CDs, financial consequences); social and ethical responsibilities for compact disk distribution (social responsibility, ethical responsibility, cultural support).

All the above criteria are qualitative except for the cost. Determination of the cost is based on average prices in black market and shops. The process for determining the criteria's initial weights and the qualitative criteria's numerical values of the alternatives that are under investigation was based on the use of interviews and an expert's method. Experts estimated the qualitative criteria by using a ten-point system. In this case, the experts have assigned 10 point to the best values of qualitative criteria and 0 point to the worst ones. All the other values of qualitative criteria were rated in the interval from 0 to 10. Further, this information was submitted by experts and was processed by applying expert methods.

Parkes (1995) argues that the following ethical criteria should be satisfied in all interviews: the researchers should receive no personal gain, individuals should not be pressured to participate, interviewers should be trained in the support of bereaved persons, interviews should be supervised, and confidentiality should be ensured. Other criteria include the minimization of stress during the interview and the provision of rigorous methodology.

Semi-structured and open-ended question interviews were used as the means for questioning a diverse group of respondents who live in Vilnius (Lithuania) and to describe their expectations and experiences during their buying of legal compact and pirated compact discs. Twenty-eight *persons* took part in face-to-face interviews: four interviews with couples and twenty with individuals were completed. Interviewees were selectively sampled within the black market area (11/28), compact disc shopping centers (11/28), and with referrals from other interviewees (6/28). To maximize the range of possible experiences and opinions, we included persons of diverse ethnicity, education levels and age and gender status. Interviewees were asked about their buying of legal compact and pirated compact discs experiences, etc. After questioning 28 respondents and processing the obtained results by using an expert's method, values of qualitative criteria and initial criteria weights were calculated.

The results of the comparative analysis on the buying legal compact and pirated compact discs alternatives are presented as a grouped decision-making matrix where lines contain alternatives, while all quantitative information pertaining to them is found in Table 2. The quantitative information is based on the criteria system, units of measure, values and initial criteria weights of the alternatives. The quantitative information is accurate and reliable and allows one to use multiple criteria decision-making methods. When the decision-making matrix is formed on-line then a multiple criteria analysis of ethical alternatives can be performed.

Currently, by using the EDSS the alternatives may be analyzed according to one, several or simultaneously three theories of philosophy (utilitarianism, deontology, justice). This pro-blem was analyzed in regard to these three theories at once (see Table 2). It can also be seen from the data presented in the table 2 that each alternative has both positive and negative features.

In this example scores measured all criteria, with the exception of the price. The price is measured in Euros. The magnitude of weight indicates how many times one criterion is more significant than another criterion for buyers of legal compact and pirated compact discs. For example, the cost ($q_{10} = 0.7$) is 2.33 ($q_{10} : q_8 = 0.06 : 0.03 = 2$) times more significant for buyers of legal compact and pirated compact discs than the prosecution risk ($q_8 = 0.3$).

The following is an example that contains a short discussion on one of the criteria "Presence of the Compact Music Disc on the Market" (Table 3) and its purpose is to provide a more explanation of this criterion weight and values given in Table 2.

Criterion values. Under the *utilitarianism theory* consumers should be provided with access to goods and services irrespective of obstacles. Therefore the availability on the market of pirated copies of compact music discs (provided the consumers are in no position to purchase them legally) under this theory is regarded more positively ($X_{22} = 8$ points) than according to *the theories of utilitarianism and justice. The deontological theory*, however, requires social responsibility and fulfilment of one's duties, therefore the assessment is not so favourable – $X_{12} = 3$ points. And *the theory of justice* which emphasizes adherence to laws gives only $X_{32} = 2$ points. In assessing the Presence of Compact Music Disc on the Market criterion ($X_{42} = 4,33$ points) on the basis of all three abovementioned theories, experts place more emphasis on the opportunity to purchase a product or service and not

Ta b l e 2. **Fragment of multiple criteria analysis of ethical alternatives**

SOCIAL, LEGAL AND ETHICAL COMPARATIVE ANALYSIS OF LEGAL AND PIRATE MUSIC CDs DISTRIBUTION

Results of Multiple Criteria Evaluation

Criteria under evaluation	Measuring units of criteria	±	Weights of criteria	Weighted normalized values of criteria of the comparable alternatives (The alternatives are scored from 0 to 10 points, the higher the score, the better the criterion)	
				Purchase of legal compact discs	Puchase of pirated compact discs
Price of compact music disk	Euro	-	18,33	14,1	4,23
Presence of compact music disk in market	Points	+	4,33	1,7722	2,5578
Accessibility of compact music disk to consumer (place)	Points	+	4,33	2,2779	2,0521
Accessibility of compact music disk to consumer (time)	Points	+	4	1,78	2,22
Legality of distribution	Points	+	13,33	7,1398	6,1902
Presence of legal responsibility for illegal distribution of CDs	Points	-	5,33	0	5,33
Financial consequences	Points	-	13,67	0	13,67
Social responsibility	Points	+	12,33	12,33	0
Ethical responsibility	Points	+	14	14	0
Cultural support	Points	+	14,33	14,33	0
Total sum of maximizing normalized balanced rates S_{+j}				53,6299	13,0201
Total sum of minimizing normalized balanced rates S_{-j}				14,1	23,23
Object's significance Q_j				76,8599	27,1201
Object's degree of efficiency N_j				100%	35,29%
Object's priority				1	2

Ta b l e 3. **Short explanation of criterion "Presence of the Compact Music Disc on the Market" weight and values according to different ethical theories**

Ethical theories	Units of measu- rement	Weight (q_i) of criterion according to different ethical theories	1. Legal compact music discs	2. Pirated copies of compact music discs
			Values (x_{ij}) of criterion according to different ethical theories	
Presence of the Compact music disc on the Market				
1. Deontology	Points	5	2	3
2. Utilitarianism	Points	3	3	8
3. Justice	Points	5	4	2
4. All above theories	Points	4,33	3	4,33

on the moral issues related to its acquisition (see Table 3).

Weight of this criterion. The *theory of utilitarianism* states that consumers should have access to goods and services and does not place so much emphasis on currently established moral, legal and other restrictions. Hence, those individuals who choose to follow this theory have broader freedom of choice in decision making. At the same time *deontology* requires that each

individual be held considerably more responsible for the performance of his/her duties, it places more restrictions on individuals' choices in various spheres of activity. *The theory of justice* emphasises the superiority of the necessity to abide by laws and thereby restricts individual's choices within the framework of the relevant legal norms. Therefore the Presence of the Compact music disc on the Market criterion is more significant (5:3 = 1,67 times) when viewed from the perspective of deontology or theory of justice ($q_1 = q_3 = 5$) then as viewed from the utilitarianism perspective ($q_2 = 3$). When assessing the weight of the Compact music disc on the Market criterion under all three theories, eight experts who constantly keep corresponding theory (utilitarianism, deontology and theory of justice) were interviewed. The analysis conducted on the basis of expert methods shows that the weight of the Presence of Compact music disc on the Market criterion under at once *all three theories* is $q_4 = 4,33$ (see Table 3).

As can be seen from the data given in Table 2, it is quite difficult to say which of the broad-brush alternatives within Vilnius is more ethical. The cost of legal compact disc alternatives is higher, while accessibility to compact music disk to consumers (place), legality of distribution, presence of legal responsibility for the illegal distribution of CDs, financial consequences, social responsibility, ethical responsibility and cultural support, were more favorable. The pirated compact disc alternative, however, differs from that of legal compact discs in that it possesses a lower cost, presence of compact music disk in the market and accessibility of compact music disk to consumers (time), which were more positive compared with the legal compact disc alternative.

The results of a multiple criteria evaluation of ethical alternatives are presented in Table 2.

Table 2 shows that the first alternative (legal acquisition of compact discs) is the most truthful, efficient, ethical and the utility degree equals 100%. The buying of pirated compact disc's alternative was second according to priority, and its utility degree was equal to 35,29%. The level of the usefulness of the comparative alternatives expresses the level of the ability to reach a customer's goals.

Conclusions

Presently, the Internet is easily accessible for many European habitants. With the present increase of speed, complications and the complexity of modern life, more attention is being paid to solving many and various ethical problems. Ethical questions have become the constituent part of the solution of all the more important and complex problems. Therefore, a necessity has arisen to solve the various ethical problems by applying Web-Based decision support systems. There are many ethical decision-making models in the world, designed to solve ethical problems but with little use of information technologies. Further, these models cannot always be applied directly to the development of the Web-Based decision support systems. Therefore, the authors developed their Web-Based Model of Multiple Criteria Ethical Decision-Making, on the same grounds of which the Ethical Web-Based Decision Support System (EDSS) was designed. The created EDSS can help stakeholders to manage their mutual relationship efficiently, to minimize the conflict-of-interest situations and to solve them. EDSS differs from other systems in its use of new Web-Based Model of Multiple Criteria Ethical Decision-Making as were developed by the authors. The database and database of best practice were also developed and can provide a comprehensive as-

sessment of alternative versions from the applied formal code of ethics, rules, criteria of ethical behavior, ethical standards, codes of conduct, the existing cultural, social, ethical dimensions of the country, the Law (the labor law, etc.), etc. and influence the arising ethical problems and ethical solution making. The developed EDSS enables the user to analyze ethical alternatives quantitatively (i. e. a system and subsystems of criteria, units of measure and values and weights) and conceptually (i. e. the text, formula, schemes, graphs, diagrams and videotapes). Further, the user-friendly window-based interface of the system enables the decision maker/user to take full advantage of the capabilities of the system in order to make effective real-time decisions.

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INTERNETINĖ PARAMA PRIIMANT DAUGIAKRITERIUS ETINIUS SPRENDIMUS

Artūras Kaklauskas, Valdas Pruskus

S a n t r a u k a

Didėjant šiuolaikinio gyvenimo spartai, sudėtingumui ir kompleksiškumui vis daugiau dėmesio skiriama įvairioms etinėms problemoms. Etiniai klausimai tampa visų svarbesnių socialinių, ekonominių ir kultūrinių problemų sprendimo sudedamąja dalimi. Todėl atsirado būtinybė įvairius etinius klausimus kvalifikuotai spręsti naudojant internetines sprendimų paramos sistemas. Nors pasaulyje sukurta daug etikos problemų sprendimų priėmimo modelių, tačiau mažai naudojamos informacinės technologijos. Be to, šiuos modelius ne visada galima tiesiogiai pasitelkti kuriant internetines sprendimų paramos sistemas. Straipsnyje pateikiamas autorių sukurtas internetinis daugiakriteris etinių sprendimų priėmimo modelis. Jis buvo kuriamas remiantis etiniais autonomiškumo, geradarystės, žalos nedarymo, teisingumo ir atsidavimo bei keliais sprendimų priėmimo (sprendimo ir jo pasekmių gyvavimo ciklo analizės, įvairių mokslų sąsajos, daugelio variantų sudarymo ir daugiakriterės alternatyvų analizės bei nagrinėjamų alternatyvų etiškumo laipsnio priklausomumo nuo suinteresuotų grupių ir jų tikslų) principais. Aptariami pagrindiniai etinių sprendimų priėmimo etapai, išryškinamos utilitarizmo deontologijos ir teisingumo teorijų nuostatos, kuriomis remiantis įvertinamos alternatyvos ir priimami sprendimai. Kad pasiūlytas modelis būtų vaizdesnis, straipsnyje pateikiamas jo pagrindu išspręstas pavyzdys.

Reikšminiai žodžiai: etika, etinių sprendimų priėmimas, daugiakriterė analizė, internetinė etinių sprendimų paramos sistema.