

# **MODELING OF VALUE ADDED TAX SYSTEM USING ANALYTIC HIERARCHY PROCESS**

**KH. N. SARGSYAN**

Today, giving high quality services in any kind and field is highly important, so the governmental offices are kinds of organizations which need to improve their services quality. One of the most important of such organizations is Taxation Organization which extremely interacts with the clients. Value Added Tax (VAT) is considered as one of the most prevalent and modern taxation system around the world.

Underlying both views-of the VAT as a beneficial expansion of the armory of tax instruments available to governments, or as all too easy a source of revenue-is a common presumption of fact: that adoption of a VAT makes it easier to raise revenue and in that sense improves the efficiency of the overall tax system [1]. Value Added Tax (VAT): VAT as a kind of indirect taxes with tax credit, which is eventually incurred on consumption total costs and it is paid by customer (end user) not entrepreneurs (producers etc.) [2].

VAT is a kind of multi-stage tax- on- sales which exempts goods purchase and intermediate services from tax payment. In the exertion of such tax, tax credit is considered for enterprise intermediate purchases so this removes cascading taxation phenomenon in implementation of such tax [5].

VAT is one of the most important public taxation tools which newly introduced. Some of interpreters imply this kind of tax as an economic efficient source and they assume that if it is task. Inappropriately designed, it may affect on decision that made by private sector. Anyway, the executive costs and costs for calculations, collection, auditing and taxation department may be high. Therefore, all of VAT implementation stages, from legislation to execution are very important. Most of conducted studies in this field have implied law and policy making subjects,

while dealing with some cases such as threshold level, taxation rates and their multiplicity, exemptions, exploration of legal cases and the like. But its administrative and executive aspects are remarkably important. In fact, one could say that there is no optimal taxation structure, but a reference and useful set of such taxes has been created. There is no single regulation for designation of taxes system or even a certain kind of tax and no one could find a country where all taxes are optimally designed. So the reform process of taxation system is not a fixed process and it is different within various countries based on the existing conditions.

The analytic hierarchy process (AHP) developed by Thomas L. Saaty [3] is a valuable method for multi-criteria decision making, which allows the decision makers to visually structure a complex problem in the form of hierarchy. AHP is highly acclaimed for its simplicity in relation to other decision making weight-determining models [4], particularly because it employs the formal tools for expert judgment quantification based on pairwise comparative evaluations of each factor on a given level with respect to other related factor. One of the most important advantages is, of course, the universal applicability of the method, because of its general nature.

The first step of the AHP is structuring the problem into a set of criteria with multilevel hierarchy. The AHP method is centred on calculating the weights and priorities of criteria level by level starting from the top, so that the priorities can be summarized by multiplying the weight from the lowest level to the highest, for determining the overall influence on the central goal/focus of the problem. As a result of pairwise comparisons, we get a square, positive, reciprocal matrix for each given group of criteria. An important step that precedes the process of a number of consecutive iterations of the normalized matrixes is calculating the consistency of pairwise comparisons to eliminate the chance of getting the data based on inconsistent human judgement. An

unacceptable level of consistency of expert evaluations suggests reconsidering the existent hierarchy of criteria or the experts.

We start by creating a hierarchic chart of criteria (Fig. 1), which is then followed by pairwise comparison (Table 1) resulting into AHP matrixes (Table 2).

Fig. 1—AHP model for Prioritizing Requirements

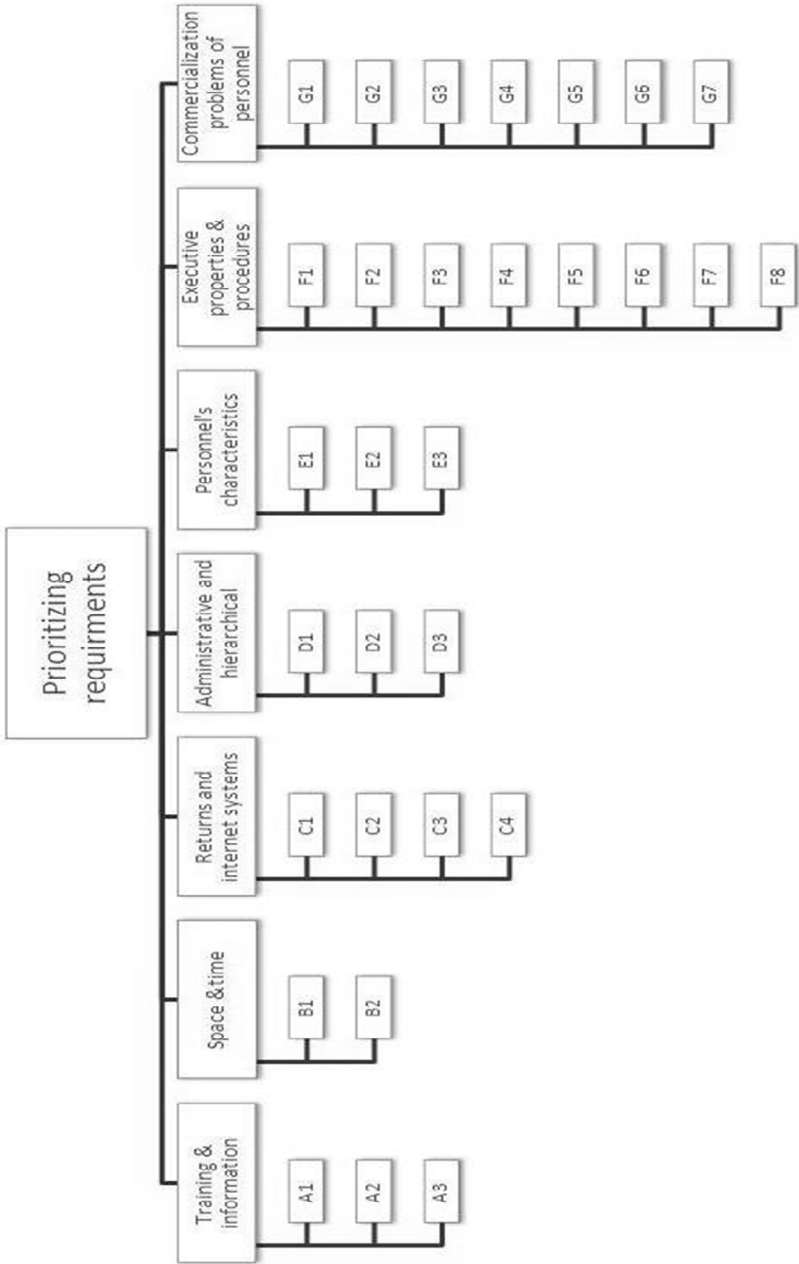


Table 1 – Pairwise comparison

Element		More Important	Intensity (1-9)	
A	B			
Train. & info.	compared with	Space & time	A	2
		Returns & internet system	A	2
		Admin. & hierarchical	A	3
		Personnel	A	2
		Executive P&P	A	2
		Problems of personnel	A	2
Space & time	compared with	Returns & internet system	A	3
		Admin. & hierarchical	B	2
		Personnel	A	5
		Executive P&P	B	3
		Problems of personnel	B	2
Returns & internet system	comp. with	Admin. & hierarchical	B	4
		Personnel's char.	-	1
		Executive P&P	B	3
		Problems of personnel	B	2
Admin. & hierarchical	comp. with	Personnel's char.	A	7
		Executive P&P	B	2
		Problems of personnel	B	2

Personnel's char.	v s	Executive P&P	B	2
		Problems of personnel	B	3
Executive P&P	v s	Problems of personnel	B	3

### *Explanation*

1	Two elements contribute equally to the objective
3	Experience & judgment slightly favour one element over another
5	Experience & judgment strongly favour one element over another
7	One element is favoured very strongly over another, its dominance is demonstrated in practice
9	The evidence favouring one element over another is of the highest possible order of affirmation
<i>2,4,6,8 can be used to express intermediate values</i>	

*Table 2 – AHP matrixes*

Primary matrix

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>
<i>A</i>	1	3	3	4	3	2	2
<i>B</i>	1/3	1	3	1/2	5	1/3	1/2
<i>B</i>	1/3	1/3	1	1/4	1	1/3	1/2
<i>D</i>	1/4	2	4	1	7	1/2	1/2
<i>E</i>	1/3	1/5	1	1/7	1	1/2	1/3
<i>F</i>	1/2	3	3	2	2	1	1/3
<i>G</i>	1/2	2	2	2	3	3	1

Normalized matrix								1 <sup>st</sup> iteratio n	6 <sup>th</sup> iteration
<b>A</b>	0,31	0,26	0,18	0,40	0,14	0,26	0,39	27,6%	<b>30,3%</b>
<b>B</b>	0,10	0,09	0,18	0,05	0,23	0,04	0,10	11,2%	<b>9,8%</b>
<b>C</b>	0,10	0,03	0,06	0,03	0,05	0,04	0,10	5,7%	<b>7,0%</b>
<b>D</b>	0,08	0,17	0,24	0,10	0,32	0,07	0,10	15,2%	<b>11,8%</b>
<b>E</b>	0,10	0,02	0,06	0,01	0,05	0,07	0,06	5,3%	<b>6,4%</b>
<b>F</b>	0,15	0,26	0,18	0,20	0,09	0,13	0,06	15,4%	<b>14,6%</b>
<b>G</b>	0,15	0,17	0,12	0,20	0,14	0,39	0,19	19,5%	<b>20,1%</b>

CI 0.173

CR **13.1 %**

Eigenvalue 8.036

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After that we calculate the weight of each sub-criterion which is the product of its own weight in the group and the weight of the level one criterion. For example, the weight of A1sub-criterion – “Being informed on time of rules and procedures without presence of taxpayer in office” is calculated by multiplying its group weight, which we have calculated using AHP pairwise evaluation (54.5%) by the weight of “Training and information” criterion (30.3%), and so we get its overall weight, which is 0,1654 or 16.5%. Thus AHP provides us with a powerful and simple tool that facilitates this type of evaluation with multi-criteria models.

*Table 3 – Final Results*

<b>Training and information</b>		
A1	Being informed on time of rules and procedures without presence of taxpayer in office	0,1654 16,5%
A2	Being informed of tasks and method of execution of rules and regulations	0,0510 5,1%
A3	Rapid and proper response to questions and problem	0,0870 8,7%
<b>Space and time</b>		
B1	Existence of welfare services and facilities	0,0737 7,4%
B2	Appropriateness of office location in terms of accessibility	0,0246 2,5%
<b>Returns and internet system</b>		
C1	Site appropriate accountability, especially at weekends, submission of declaration letter	0,0318 3,2%
C2	Confidence in site	0,0192 1,9%
C3	Disambiguation of some cases and lack of general statement	0,0077 0,8%
C4	Proficiency over filling out declaration letter	0,0110 1,1%
<b>Administrative and hierarchical</b>		
D1	Increase in fast doing affairs	0,0171 1,7%
D2	Improvement of administrative organization	0,0744 7,4%
D3	Not being stranded in office reasonably	0,0264 2,6%
<b>Personnel's characteristics</b>		
E1	Personnel with the needed ability and adequate trainings	0,0349 3,5%
E2	To observe administrative order and discipline and occupational morals	0,0108 1,1%
E3	Confidentiality	0,0183 1,8%
<b>Executive properties and procedures</b>		
F1	Binding all companies to pay tax	0,0329 3,3%
F2	Observance tax justice and avoiding from discrimination	0,0124 1,2%
F3	Updating information of Taxation Organization	0,0179 1,8%
F4	Co-orientation of incongruent rules and regulations	0,0215 2,2%
F5	Characterization of exemptions exact list	0,0126 1,3%
F6	To make rules and regulations clear and transparent and reducing number of procedures	0,0206 2,1%
F7	Minimization of exerting personal taste	0,0140 1,4%
F8	Removal problems concerning to attending (tax)	0,0144 1,4%
<b>Problems of personnel</b>		
G1	Increase on organization facilities	0,0646 6,5%
G2	Being proficient in rules	0,0171 1,7%
G3	Removal living problems completely	0,0217 2,2%
G4	To change social negative	0,0140 1,4%
G5	To reduce work high capacity	0,0271 2,7%
G6	Transparency of tasks description	0,0277 2,8%
G7	Doing actual assessments and not based on personal taste	0,0283 2,8%

## Literature

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**Х. Н. САРГСЯН**  
**МОДЕЛИРОВАНИЕ СИСТЕМЫ НАЛОГА НА**  
**ДОБАВЛЕННУЮ СТОИМОСТЬ С ИСПОЛЬЗОВАНИЕМ**  
**МЕТОДА АНАЛИЗА ИЕРАРХИЙ**

**Резюме**

Менеджеры систем налогообложения сталкиваются с новыми вызовами в данной сфере как в развитых, так и развивающихся странах, в частности в странах с переходной экономикой. Целью данной статьи является применение метода анализа иерархий для идентификации и приоритизации требований налогоплательщиков для системы НДС (налог на добавленную стоимость), основанных на ряде важных критериев и попарных сравнений. Для вычислений весовых коэффициентов используется программное обеспечение Microsoft Excel 2010. Полученные результаты исследования могут быть применены для принятия решений руководителями систем налогообложения, а также для принятия связанных решений.

**Ключевые слова:** *Моделирование, Система налогообложения, Налог на добавленную стоимость (НДС), Метод анализа иерархий.*

**Խ. Ն. ՍԱՐԳՍՅԱՆ**  
**ԱՎԵԼԱՑՎԱԾ ԱՐԺԵՔԻ ՀԱՐԿԻ ՀԱՍՏԱԿԱՐԳԻ**  
**ՍՈՂԵԼԱՎՈՐՈՒՄ ՀԻԵՐԱՐԽԻԱՅԻ ՎԵՐԼՈՒԾԱԿԱՆ**  
**ՄԵԹՈԴԻ ՕԳՏԱԳՈՐԾՍԱՄԲ**

**Ամփոփում**

Այս ոլորտում հարկային համակարգի ղեկավարները կանգնած են նոր մարտահրավերների առաջ, ինչպես զարգացած, այնպես էլ զարգացող երկրներում, մասնավորապես, անցումային տնտեսությամբ երկրներում: Սույն հոդվածի նպատակն է վերլուծական հիերարխիայի գործընթացի օգտագործմամբ հայտնաբերել և դասակարգել հարկատուների ԱԱՀ (ավելացված արժեքի հարկի) համակարգի նկատմամբ պահանջները՝ հիմնված մի շարք կարևոր չափանիշների եւ զույգ համեմատությունների վրա: Կշիռների գործակիցների հաշվարկման համար օգտագործվում է Microsoft Excel 2010 ծրագրային ապահովումը: Հետազոտությունից ստացված արդյունքները հարկային համակարգերի ղեկավարները կարող են կիրառել որոշումների կայացման և ընդունման ժամանակ:

**Առանցքային քառեր.** *մոդելավորում, հարկային համակարգ, ավելացված արժեքի հարկ (ԱԱՀ), վերլուծական հիերարխիայի գործընթաց:*